BIOLOGY

SCIENCE Paper – 3

(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.

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*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:

(i) The phenomenon by which living or dead plant cells absorb water by surface attraction.

(ii) The phase of cardiac cycle in which the auricles contract.

(iii) The organ where urea is produced.

(iv) The hormone that helps increase the reabsorption of water from the kidney tubules.

(v) Chemical substances produced by micro organisms that can kill or inhibit the growth of other micro organisms. [5]

(b) Choose the correct answer from the four options given below each statement:

(i) BCG vaccine is used to build immunity against:

A. Poliomyelitis

B. Tuberculosis

C. Malaria

D. Whooping cough.

(ii) A plant is kept in a dark cupboard for about 48 hours before conducting any experiment on photosynthesis to:

A. Remove starch from the plant

B. Ensure that starch is not translocated from the leaves.

C. Remove chlorophyll from the leaf of the plant.

D. Remove starch from the experimental leaf.

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

A. Retina

B. Cornea

C. Choroid

D. Sclera.

(iv) A reflex arc in man is best described as movement of stimuli from:

A. Receptor cell, sensory neuron, relaying neuron, effector muscles.

B. Receptor cell, efferent nerve, relaying neuron, muscles of the body.

C. Receptor cell, spinal cord, motor neuron, relaying neuron.

D. Receptor cell, synapse, motor neuron, relaying neuron.

(v) NADP is expanded as:

A. Nicotinamide, adenosine dinucleostide phosphate.

B. Nicotinamide, adenine dinucleotide phosphate

C. Nicotinamide, adenine dinucleous phosphate

D. Nicotinamide, adenosine dinucleous phosphate. [5]

(c) State the main function of the following:

(i) Chordaé tendinae

(ii) Lymphocytes

(iii) Seminiferous tubule

(iv) Thylakoids

(v) Beta cells of pancreas [5]

(d) Give the exact location of the:

(i) Lenticels

(ii) Prostate gland

(iii) Thyroid gland

(iv) Centrosome

(v) Mitral valve. [5]

(e) Given below are sets of five terms each. In each case rewrite the terms in logical sequence as directed at the end of each statement. *An example has been done for you*:

Example:

Cortical cells, Root hair, xylem, Soil water, endodermis (absorption of water by the plants)

Answer: Soil water, Root hair, cortical cells, endodermis, xylem

(i) Active immunity, Antigen, Antibody, Bacteria, Lymphocytes (defence mechanism of the body).

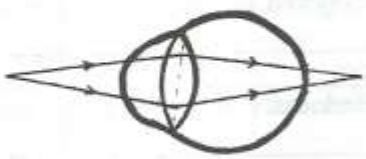
(ii) Implantation, Parturition, Ovulation, Gestation, Fertilisation (stages leading to formation of foetus and birth).

(iii) Oval window, Tympanum, Cochlea, Auditory canal, Ear ossicles (path through which a vibration of sound is transferred in the human ear).

(iv) Karyokinesis, S- phase, Cytokinesis, G1 – phase, G2 – phase (cell cycle).

(v) Renal vein, Renal artery, Afferent arteriole, Efferent arteriole, Glomerulus (pathway of blood through glomerulus). [5]

(f) Study the following diagram carefully and then answer the questions that follow. The diagram is depicting a defect of the human eye:



(i) Identify the defect shown in the diagram.

(ii) Give *two* possible reasons for the above defect.

(iii) Draw a neat labelled diagram to show how the above defect can be rectified. [5]

(g) Match the items in column A with that which is most appropriate in column B. **Rewrite the matching pairs**:

Column A	Column B
(1) Potometer	(a) Antiseptic
(2) Hypothalamus	(b) Disinfectants
(3) Formalin	(c) Vasectomy
(4) Contraception in males	(d) Sudden change in genes
(5) Mutation	(e) Pituitary gland
	(f) Tubectomy
	(g) Transpiration
	(h) Thyroid gland
	(i) Alleles
	(j) Photosynthesis

[5]

(h) Given below are six sets with four terms each. In each set a term is an odd one and cannot be grouped in the same category to which the other three belong. Identify the odd one in each set and name the category to which the remaining three belong. The first has been done for you as an example.

No.	Set	Odd one	Category
eg:	Cell wall, large vacuole, plastids, centrosome	centrosome	Parts of plant cell
(i)	Cerebrum, cerebellum, thalamus, hypothalamus		
(ii)	Ovary, ureter, fallopian tube, uterus.		
(iii)	Adrenal gland, liver, thyroid gland, pituitary gland		
(iv)	Malleus, pinna, incus, stapes		
(v)	Haemophilia, colour blindness, albinism, night blindness		

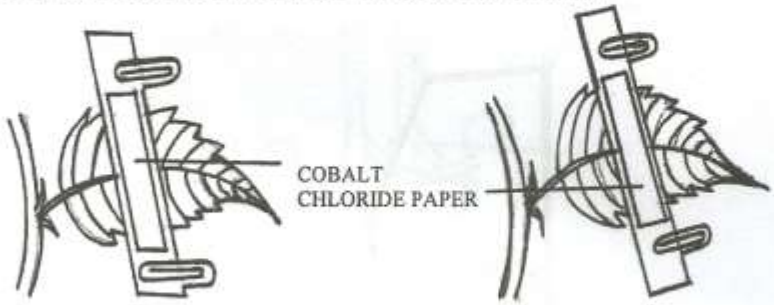
[5]

SECTION II (40 Marks)

*Attempt any **four** questions from this Section*

Question 2

(a) Given below is an experimental set up to demonstrate a particular process. Study the same and answer the questions that follow:



(i) Name the physiological process being studied.

(ii) Explain the process mentioned above.

(iii) What is the aim of the above experiment?

(iv) What would you observe in the experimental set-up after an hour? Give a reason to support your answer.

(v) Mention any *three* adaptations found in plants to overcome the physiological process mentioned in (i) above. [5]

(b) Give the biological / technical terms for the following:

(i) A membrane which allows the passage of molecules selectively.

(ii) The suppressed allele of a gene.

(iii) Structure that carries visual stimuli from retina to the brain.

(iv) WBCs squeeze through the walls of the capillaries into the tissue.

(v) Protective coverings located round the human brain and spinal cord.

(vi) Eye lens losing flexibility resulting in a kind of long sightedness in elderly people.

(vii) Hormones which stimulate other endocrine glands to produce their specific hormones.

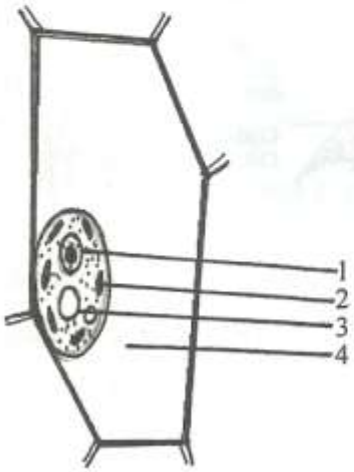
(viii) The phase in the menstrual cycle in which the remnant of follicle in the ovary turns to Corpus luteum.

(ix) Statistical study of human population.

(x) Artificially introducing weakened germs or germ substance into the body for developing resistance to a particular disease. [5]

Question 3

(a) Given below is the diagram of a cell as seen under the microscope after having been placed in a solution:



(i) What is the technical term used for the state/condition of the cell given above?

(ii) Give the technical term for the solution in which the cell was placed.

(iii) Name the parts numbered 1 to 4.

(iv) Is the cell given above a plant cell or an animal cell? Give two reasons in support of your answer as evident from the diagram.

(v) What would you do to bring this cell back to its original condition? [5]

(b) Differentiate between the following pairs on the basis of what is mentioned in brackets:

(i) Natality and mortality (definition)

(ii) Stoma and Stroma (describe its structure)

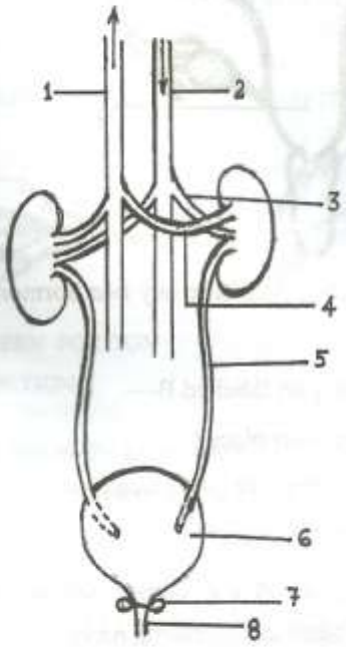
(iii) Acromegaly and Cretinism (symptoms)

(iv) Transpiration and Guttation (structures involved)

(v) Diabetes mellitus and Diabetes insipidus (reason /cause) [5]

Question 4

(a) The diagram below shows the Excretory System of a Human being. Study the same and then answer the questions that follow:



(i) Name the parts labelled 1, 2, 3 and 4.

(ii) Give the main function of the parts labelled 5, 6, 7 and 8.

(iii) Name the endocrine gland which could be added in the diagram and state its location/position. [5]

(b) Briefly explain the following:

(i) Osmosis

(ii) Allele

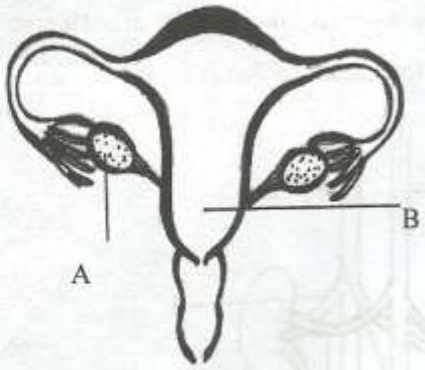
(iii) Pulse

(iv) Reflex action

(v) Synapse. [5]

Question 5

(a) Study the diagram given below and then answer the questions that follow:



(i) Name the part labelled A. Name any *two* hormones produced by the part labelled A.

(ii) What happens to the part labelled B—

(1) If fertilisation takes place?

(2) If fertilisation does not take place?

(iii) Where does fertilisation occur?

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

(1) Acrosome

(2) Mitochondria [5]

(b) A homozygous plant having round (R) and yellow (Y) seed is crossed with homozygous plant having wrinkled (r) and green (y) seeds:

(i) Give the scientific name of the plant on which Mendel conducted his hybridization experiments.

(ii) Give the genotype of the F_1 generation.

(iii) Give the dihybrid phenotypic ratio and the phenotype of the offspring of the F_2 generation when two plants of the F_1 generation are crossed.

(iv) Name and state the law which explains the dihybrid ratio.

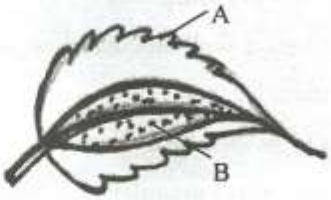
(v) Give the possible combinations of gametes that can be obtained from F_1 hybrid. [5]

Question 6

(a) The diagram given below is an experiment conducted to study a factor necessary for Photosynthesis. Observe the diagrams and then answer the following questions:

BEFORE THE EXPERIMENT

AFTER THE EXPERIMENT



(i) What is the aim of the experiment?

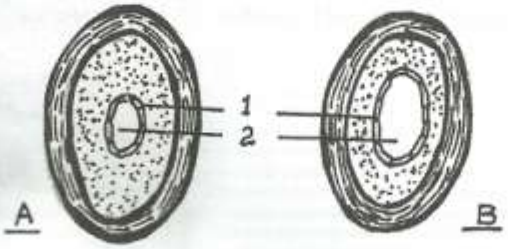
(ii) Name the test performed on the leaf and the solution used for the test.

(iii) What type of leaf was used for the experiment? Give an example.

(iv) What is the expected result of the above test on the parts labelled A and B?

(v) Give a balanced chemical equation to represent the process of Photosynthesis. [5]

(b) The diagrams given below show the cross section of two kinds of blood vessels:



(i) Identify the blood vessels A and B. In each case give a reason to support your answer.

(ii) Name the parts numbered 1and 2.

(iii) When are the sounds "LUBB" and "DUP" produced during a heartbeat?

(iv) Name the blood vessel that

(1) begins and ends in capillaries.

(2) supplies blood to the walls of the heart. [5]

Question 7

(a) Answer the following:

(i) Draw a well labelled diagram of a 'Neuron' and name the following parts:

(1) Node of Ranvier

(2) Nissil granules

(3) Cyton

(ii) Name the part of the human brain which is concerned with the following:

(1) Seat of memory

(2) Coordinates muscular activity.

(iii) Mention any *three* major activities of the WHO. [5]

(b) (i) Draw a well labelled diagram to show the metaphase stage of Mitosis in an animal cell having four chromosomes.

(ii) Mention any *two* reasons for the population explosion in INDIA.

(iii) Give biological reasons for the following:

(1) Pituitary gland is also known as the master gland.

(2) Gametes have a haploid number of chromosomes. [5]