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) Four friends **P**, **Q**, **R** and **S** were discussing the examples of genetic disorders. The examples they quoted were as follows:

P. Colour blindness and Malaria

Q. Albinism and Cholera

R. Haemophilia and Colour blindness

S. Haemophilia and Albinism

Who gave the correct examples?

(a) P and Q

(b) R and S

(c) P and R

(d) Q and S

(ii) During the ventricular systole, the atrioventricular valves (P) _____ and the semilunar valves (Q) _____.

(a) P – close and Q – open

(b) P – close and Q – close

(c) P – open and Q – close

(d) P – open and Q – open

(iii) **Assertion (A):** A thick cuticle reduces transpiration by acting as a barrier.

Reason (R): Desert plants have large, thin leaves for transpiration.

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

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

(c) Both (A) and (R) are true and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(iv) A sequence of DNA has 300 nitrogenous base pairs, of which 75 are Guanine. What is the number of Thymine in this sequence?

(a) 150

(b) 100

(c) 50

(d) 75

(v) **Assertion (A):** Abscisic acid promotes stomatal closure during a drought.

Reason (R): Abscisic acid helps the plant to conserve water during stress.

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

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

(c) Both (A) and (R) are true and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(vi) **Assertion(A):** Leukoderma is the biological term for blood cancer.

Reason(R): An abnormal increase in the number of WBCs causes blood cancer.

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

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

(c) Both (A) and (R) are true and (R) is the correct explanation of (A).

(d) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(vii) A health organisation wants to educate the rural audience about population control using visually engaging methods. Which of these would be effective?

P. Posters

Q. Loudspeakers

R. Film shows

S. Street plays

(a) P, R and S

(b) Q, R and S

(c) P, Q and R

(d) P, Q and S

(viii) A family has a history of colour blindness. During a genetic testing, it was found that the mother is a carrier of colour blindness (X^C X) and the father has normal vision (XY). What is the probability of their sons being colour blind?

(a) 25%

(b) 50%

(c) 75%

(d) 0%

(ix) Bharat woke up late in the morning and missed the school bus.

This situation stimulated the nerves of the sympathetic system which resulted in:

(a) Constriction of Coronary arteries

(b) Muscle relaxation

(c) Decrease in Respiration rate

(d) Bronchodilation

(x) Which is the correct sequence of blood flow in the Pulmonary and Systemic Circulation?

(a) Right Atrium → Right Ventricle → Lungs → Left Atrium → Left Ventricle → Body tissues

(b) Left Ventricle → Left Atrium → Body tissues → Right Atrium → Right Ventricle → Lungs

(c) Left Ventricle → Left Atrium → Lungs → Right Ventricle → Right Atrium → Body tissues

(d) Right Atrium → Right Ventricle → Body tissues → Left Atrium → Left Ventricle → Lungs

(xi) Karan was standing on a high stool and cleaning the ceiling fan.

He suddenly loses balance and sustains a head injury. An examination reveals that his pupils have lost the capacity to constrict in bright light. Which structure has been damaged?

(a) Suspensory ligaments

(b) Medulla oblongata

(c) Eye lens

(d) Eye lid

(xii) A person suffering from kidney failure has proteins in the urine. What is this condition called?

(a) Haematuria

(b) Glycosuria

(c) Albuminuria

(d) Anaemia

(xiii) What does *Swachh Bharat Abhiyan* aim to achieve in India?

(a) Increase in deforestation to dump waste.

(b) Expansion of landfill areas to accommodate more waste.

(c) Improved sanitation and solid waste management.

(d) Greater industrial waste production.

(xiv) Varun's mother added plenty of salt to the mango pickle she made. This is to:

A. enhance the colour of the pickle.

B. inhibit the growth of microorganisms.

C. increase the nutritional value.

D. create a hypertonic solution.

(a) A and C

(b) B and C

(c) C and D

(d) B and D

(xv) During which phase of menstrual cycle does the endometrium shed?

(a) Follicular phase

(b) Ovulatory phase

(c) Menstrual phase

(d) Luteal phase

Question 2

(i) Give the biological / technical terms for the following: [5]

(a) The tropic movement wherein the tendrils of a pea plant twine around a support.

(b) A defect in our eye in which some parts of the object are in focus while the other parts are blurred.

(c) The type of waste generated in hospitals and pathological laboratories.

(d) The surgical technique for females that can be used to prevent pregnancy.

(e) The evolutionary process by which new species arise from the existing ones.

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

Living organisms reproduce to form new individuals of their own kind. This is essential for the survival and continuation of species. Human sperms are microscopic structures that carry genetic material.

The head of the sperm has a cap like organelle called (a) _____ *(Lysosome / Acrosome)* which produces an enzyme (b) _____ *(Hyaluronidase / Amylase)* that dissolves the outer layer of the ovum to facilitate fertilisation. The nucleus of the sperm has (c) _____ *(23 / 46)* chromosomes. The middle piece has (d) _____ *(Chloroplast / Mitochondria)* to provide energy for the motility of the sperm. (e) _____ *(Semen / Hymen)* is a mixture of sperms and the fluids produced by the male accessory glands.

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

(a) Auxin, Oxytocin, Gibberellin, Cytokinin

(b) Growth Hormone, Vasopressin, Thyroid Stimulating Hormone, Gonadotropic Hormone

(c) Urochrome, Urea, Uric acid, Nucleic acid

(d) Cervix, Chordae Tendinea, Papillary Muscles, Sinoatrial node

(e) Morula, Blastocyst, Oviduct, Foetus

(iv) Mohit, a 30-year-old man was a software professional leading a sedentary life. He showed signs of *high blood sugar* during a routine health check-up despite having a normal body weight. [5]

Answer the following:

(a) The hormonal disorder he is suffering from.

(b) The hormone responsible for this disorder.

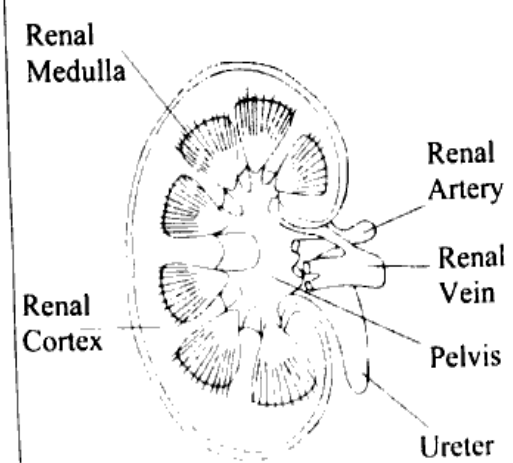
(c) The organ that secretes this hormone.

(d) One symptom experienced by Mohit due to this disorder.

(e) One change in lifestyle to lower the blood sugar level.

(v) Study the diagram given below and match the structure with its functions: [5]

Example: Pelvis – (f)

Structure	Functions
	(a) Has Malpighian capsules (b) Carries oxygenated blood (c) Transports urine to urinary bladder (d) Has Henle's loops (e) Carries deoxygenated blood (f) Receives urine which flows into ureter

SECTION B (40 Marks)

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

Question 3

(i) Which is the resting but metabolically active stage of the cell cycle? [1]

(ii) Given below is the picture of an eagle. [2]

Eagles have binocular vision. What is the advantage of such a vision?

(iii) Mention the number of *Autosomes* and *Allosomes* in a human body cell. [2]

(iv) Two well-watered, identical plants were placed in brightly lit rooms at different temperatures – one at 15°C and the other at 38°C. The plant in the warmer room showed wilting by the end of the day. [2]

(a) Which plant phenomenon resulted in the wilting of the leaves?

(b) Mention the factor of the phenomenon that is being tested.

(v) Draw a neat, labelled diagram of an animal cell showing the *Prophase* stage of Mitosis with **four** chromosomes. [3]

Question 4

(i) What is the scientific name of modern man? [1]

(ii) How are the Cytons and Axons of neurons arranged in the following? [2]

(a) Cerebrum

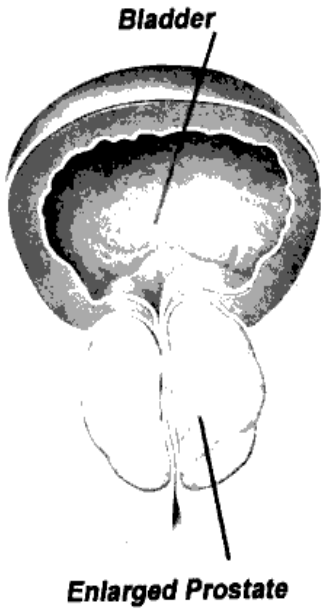
(b) Spinal Cord

(iii) (a) Who proposed the theory of Natural Selection? [2]

(b) Name the organism which was used as an example to explain *Industrial Melanism*.

(iv) Differentiate between Plasmolysis and Deplasmolysis. [2]

(v) Akshay's father had a tumour in his prostate gland. His doctor advised him to get it removed surgically. One side effect of the surgery was incontinence of urine, i.e. leakage of urine from the urinary bladder. [3]



(a) Where is the prostate gland located?

(b) Why does the prostate gland produce an alkaline secretion?

(c) Name the structure that regulates the flow of urine from the urinary bladder into the urethra.

Question 5

(i) RBCs do not have nuclei. Discuss its advantage. [1]

(ii) Arrange the following food chains in a proper sequence. [2]

(a) Small fish, Algae, Mosquito larvae, Kingfisher

(b) Frog, Snail, Crow, Green leaves

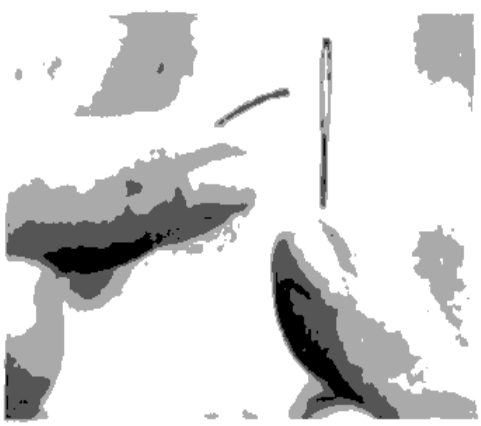
(iii) A 28-year-old pregnant lady goes to a gynaecologist for a check-up. Her doctor explains that there is normal growth of the foetus and the placenta is functioning well. [2]

(a) Mention one function of the placenta.

(b) What connects the placenta to the foetus?

(iv) Mention *any two* secondary sexual characteristics in a 15-year-old boy. [2]

(v) Tara's grandmother is 70 years old and has a passion for embroidery. She faces difficulty in threading the needle as the eye of the needle appears blurred. The ophthalmologist diagnosed it as an age-related disorder. [3]



(a) Name the eye disorder she is suffering from.

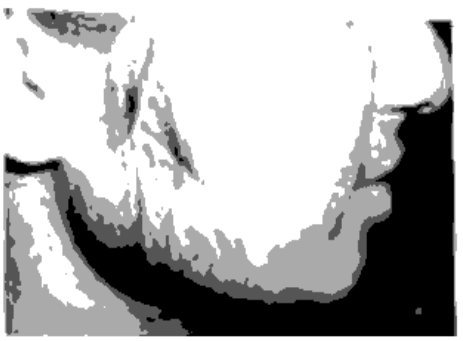
(b) How can the above defect be corrected?

(c) Where is the image formed in the above disorder?

Question 6

(i) Explain the term 'Population Density' with reference to human beings. [1]

(ii) A 17-year-old girl was having irregular menstrual cycle. Her mother took her to their family physician. She was diagnosed with Adrenal Virilism. Study the picture given below and answer the following questions. [2]



(a) Hypersecretion of which hormone results in Adrenal Virilism in human females?

(b) Mention one symptom of this disorder.

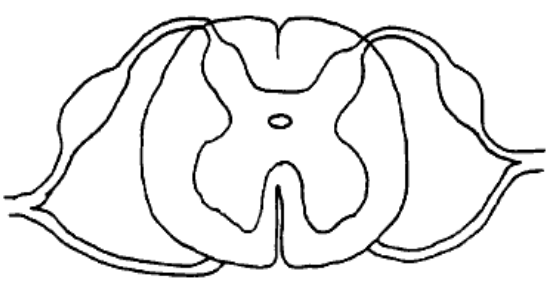
(iii) Differentiate between Mitosis in plant cell and animal cell based on Cytokinesis. [2]

(iv) Sara placed a healthy potted plant in a dark room for 48 hours to perform an experiment on photosynthesis. She plucked one of the leaves and tested it for starch. The leaf did not turn blue-black on adding Iodine solution. [2]

(a) Why was the plant placed in the dark for 48 hours?

(b) What is the significance of boiling the leaf in alcohol during the starch test?

(v) Copy the diagram given below. [3]



(a) Name the structure.

(b) Label Gray matter and White matter.

Question 7

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

(ii) Expand the abbreviations: [2]

(a) NADP

(b) ADP

(iii) (a) Explain the term *Synapse.* [2]

(b) Name the neurotransmitter that allows the transmission of impulses across the synapse.

(iv) What is the role of the following? [2]

(a) Leydig cells

(b) Seminiferous tubules

(v) *"Vanishing Greenery; A Growing Urban Crisis"* [3]

In most of our cities, rapid urbanisation has led to a significant decrease in greenery over the past two decades. As the population increased, the demand for housing, roads and commercial buildings grew, leading to clearing of parks, gardens and natural resources. This has contributed to several problems.

(a) Mention one significant problem caused by the reduction in urban greenery.

(b) How do green plants contribute to improving the air quality?

(c) What role can you, as a citizen, play in protecting urban greenery?

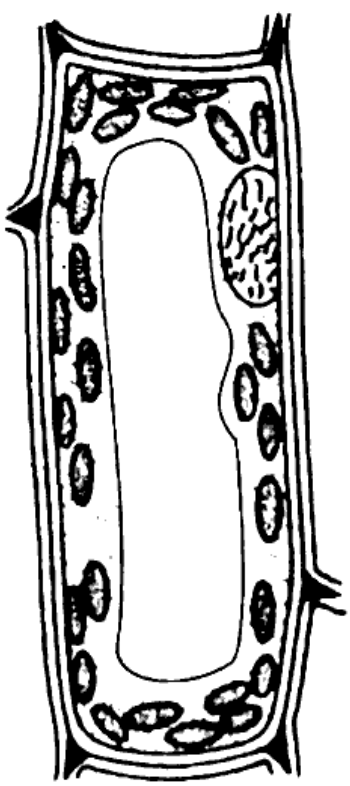
Question 8

(i) Write the term for the pressure exerted by the cell contents on the cell wall. [1]

(ii) (a) Name the fluid present between the meninges in spinal cord. [2]

(b) What is its function?

(iii) Given below is the diagram of a turgid plant cell. [2]

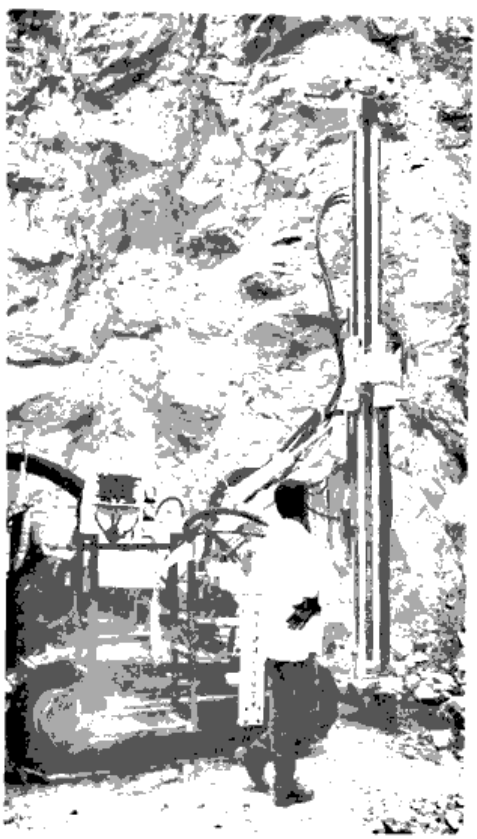


Copy the diagram and label Vacuole and Plasma membrane.

(iv) Select and write the two biodegradable wastes from the given list: [2]

Styrofoam, Metallic cans, Decaying fruits, Plastic bottles, Newspapers

(v) Rajat Singh was working as a supervisor in a stone quarry where rock, sand and gravel are extracted by techniques like digging, drilling and blasting. As the years rolled by, Rajat started facing a loss in hearing. The high decibel sounds had damaged a part of his internal ear, though the tympanic membrane was intact. [3]



(a) Give the collective term for the structure located in the internal ear.

(b) Name the sensory organ in the Cochlea which was damaged for Rajat Singh.

(c) What kind of pollution do the workers face in the stone quarry?