Biology:

General Instructions

1. Attempt all questions from Section I and any four questions from Section II.
2. 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: [8]

i. The cavity in the body in which the human lungs are located.
ii. The soluble protein present in blood plasma responsible for clotting.
iii. The part of the female reproductive system where fertilization takes place.
iv. The organisation that provides help and relief to victims of flood.
v. The process by which leucocytes engulf and destroy bacteria.
vi. Respiratory openings found on stems of woody plants.
vii. The process by which intact plants lose water in the form of droplets.
viii. Plants that prepare their own food from basic raw materials.

(b) Complete the following statements (i) to (vi) by choosing the correct alternative from those given in the brackets: [6]

i. The protective covering of lungs is the (pericardium, pleura, diaphragm).
ii. Bacteria found in the nodules of leguminous plants are (saprophytic, parasitic, symbiotic) in nature
iii. The gaseous pollutant which causes acid rain is (carbon monoxide, carbon dioxide, nitrogen dioxide).
iv. The valve present between the left atrium and the left ventricle is the (tricuspid valve, bicuspid valve, semi-lunar valve).
v. The blood vessel supplying blood to the kidney is the (renal vein, renal artery, dorsal aorta).
vi. Which of the following is an insecticide? (Phenol, DDT, carbolic acid)

(c) (a) State whether the following statements are True or False: [6]

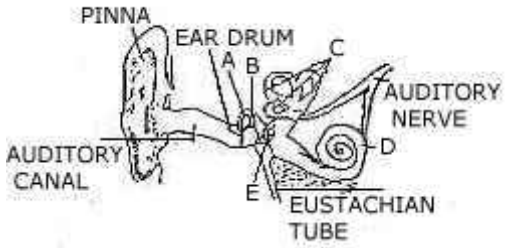
i. Deafness is caused due to the rupturing of the pinna.
ii. Penicillin obtained from Penicillium notatum is an antibody.
iii. The percentage of oxygen in inspired air is 16.4.
iv. Cells that have lost their water content are said to be deplasmolysed.
v. Photosynthesis results in loss of the dry weight of the plant.
vi. Xylem is the water conducting tissue in plants.

(b) Rewrite the false statement from 1 to 6 above in their correct form by changing the first or the last word only.

(d) Complete the following table by filling in the blank spaces numbered 1 to 6:
STRUCTURE FUNCTION [6]

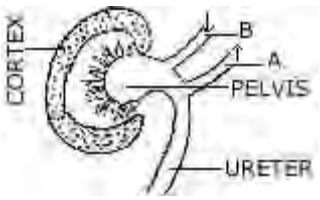
STRUCTURE	FUNCTION
Yellow spot	1
2	Filled with cell sap mostly in plants.
3	Produces male gametes in man.
Erythrocytes	4
Grana of chlorophyll	5
6	Transfers urine outside the body.

(e) Given below is the diagram of the Human Ear. Study the same and then answer the question that follow: [6]



i. What role does the ear drum play in hearing?
ii. What common term is given to the parts labeled A, B and E?
iii. Would there be any difference if these three parts mentioned in (ii) above were replaced by one big one? Why?
iv. Give the biological term for the parts labelled C and D.
v. Name the fluid which fills the parts mentioned in (iv) above.
vi. State the functions of the ear.

(f) Given below is a simple diagram of the human kidney cut open longitudinally. Answer the following questions: [6]



i. Give the definition of excretion.

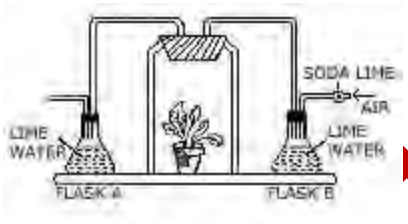
ii. Name the units of kidney.
iii. Why does the cortex of the kidney show a 'dotted' appearance?
iv. Mention two functions of the kidney.
v. Write two differences in the composition of the blood flowing through blood vessels A and B.

SECTION II (40 marks)

Attempt any four questions in this Section.

Question 2

(a) The apparatus given below was set up to demonstrate a particular process occurring in plants. Study the same and then answer the questions that follow: [6]



i. Name the process.
ii. What is the object of the experiment?
iii. Why is soda lime placed in the tube?
iv. What change, if any, would you observe in the lime water in Flask A and in Flask B? In each case give a reason for your answer.
v. Mention one precaution that should be taken to ensure more accurate results.
vi. Give an overall balanced chemical equation to represent the process.

(b) Briefly describe the functions of the following: [4]

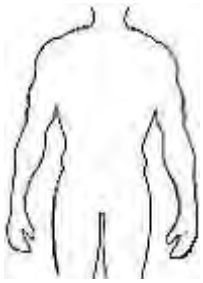
i. Epiglottis
ii. Scrotum
iii. Alveoli
iv. Placenta

Question 3 [6]

(a) (i) Given alongside is the outline of the human body . Redraw the same and then place the following organs in their correct position.

i. Thyroid glands.
ii. Windpipe.
iii. Diaphragm.
iv. Right and left lung.
v. Right and left kidney.

vi. Adrenal glands.



(ii) Name the hormone produced by the thyroid gland and state its function in the body.

(iii) What would a child suffer from if there was hyposecretion of this gland?

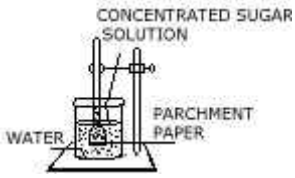
(iii) What role does the diaphragm play in inspiration of air? Explain briefly.

(b) Mention one point of difference between the following on the basis of what is given in brackets. [4]

i. Respiration and Photosynthesis (Gas released)
ii. Cerebrum and Cerebellum (Function)
iii. Antibody and Antibiotic (Source)
iv. Red blood corpuscle and White blood corpuscle (Structure)

Question 4

(a) The diagram given alongside represents an experimental set up to demonstrate a vital process. Study the same and then answer the questions that follow: [6]



i. Name the process.
ii. Define the above named process.
iii. What would you observe in he experiment can be set up after an hour or so?
iv. What control experiment can be set up for the above experiment?
v. Keeping in mind the root hair cell and its surrounding , name the part that corresponds to (1) Concentrated sugar solution (2)Parchment paper and (3) Water in the beaker.
vi. Name any other substance that can be used instead of parchment paper in above experiment.
vii. Mention two advantages of this process to the plant.

(b) [4]

1. What is meant by 'reflex action'?
2. State whether the following are simple reflexes, conditioned reflexes, or neither of the two:
   a. Sneezing
   b. Blushing
   c. Contraction of pupil
   d. Lifting up a book
   e. Knitting without looking
   f. Sudden application of brakes without thinking.

Question 5

(a) The figures given below are cross sections of blood vessels. [6]

i. Identify the blood vessels A, B and C.
ii. Name the parts labeled 1-4
iii. Mention two structural differences between A and B.
iv. Name the type of blood that flows (a) through A , (b) through B.
v. In which of the above vessels referred to in (iv) above does exchange of gases actually take place?

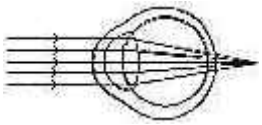
(b) Match Column A with the most appropriate term in Column B . Rewrite the correct matching pair. [4]

Column A	Column B
1. Liquid part of blood without corpuscles.	Diffusion
2. The clear front part of the eye.	Abscess
3. Place where carbon dioxide leaves the blood.	Bronchiole
4. The liquid squeezed out of blood during clotting.	Cornea
5. The spreading of particles by mixing.	Alveolus
6. Contain pus.	Iris Plasma Serum.

7. Small air tube. 8. The pigmented circular area seen in the eye.	

Question 6

(a) The alongside diagram represents a defect of vision of the human eye: [6]



i. Name the defect.
ii. What is the effect of this defect on man?
iii. Mention two causes for this defect.
iv. How can this defect be rectified?
v. Draw a neat labeled diagram to show that how this defect can be rectified.
vi. What is the nature of the image that falls on the retina of a normal eye?

(b) A candidate in order to study the importance of certain factors in photosynthesis took a potted plant and kept it in the dark for over 24 hours . Then in the early hours of the morning she covered one of the leaves with black paper in the centre only. She placed the potted plant in the sunlight for a few hours , and then tested the leaf which was covered with black paper for starch. [4]

i. What aspect of photosynthesis was being investigated?
ii. Is there any control in this experiment? If so, state the same.
iii. Why was the plant kept in the dark before the experiment?
iv. Describe step by step how the candidate proceeded to test the leaf for the presence of starch.

Question 7

(a) Give suitable explanations for any three of the following: [[6]

i. Grapes shrink when immersed in a very strong sugar solution.
ii. Breathing through the nose is said to be healthier than breathing through the mouth.
iii. A higher rate of transpiration is recorded on a windy day rather than on a calm day.
iv. Leguminous crops act as natural fertilizers.

(b) Define the following terms: [4]

i. Hormone
ii. Ultrafiltration

iii. Antiseptic
iv. Transpiration.

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General Instructions

1. *Attempt **all** questions from **Section I** and **any four** questions from **Section II**.*
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SECTION I (40 Marks)
Attempt all questions from this Section.

Question 1
(a)

i. Will the weight of an 'iron sinker plus cork' combination in water be more or less than that of the iron sinker alone in water? Give a very brief explanation for your answer. [1]
ii. The mass of a body is 70 kg. When completely immersed in water, it displaces 2000 cm^3 of water. What is the relative density of the material of the body? [3]

(b) (i) State two ways, other than direct heating by which a given quantity of liquid can be made to evaporate more quickly. [2]

(ii) The temperature recorded by a thermometer decreases when its bulb is covered with a piece of cloth soaked in spirit. Explain why? [2]

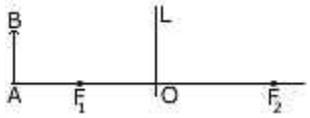
(c) (i) Draw a ray diagram to illustrate how a ray of light incident obliquely on one face of a rectangular glass slab of uniform thickness emerges parallel to its original direction. Mention which pairs of angles are equal? [2]

(ii) Is it possible to burn a piece of paper using a convex lens in daylight without using matches or any direct flame? Draw a diagram to support your answer. [2]

(d) Draw a ray diagram to show what happens to a parallel beam of light as it passes into a short-sighted or myopic eye. [4]

(ii) How can the beam be brought to focus on the retina? Illustrate your answer with an appropriate diagram. [2]

(e) The diagram below shows an object AB placed on the principal axis of a lens L. The two foci of the lens are F_1 and F_2. The image formed by the lens is erect, virtual and diminished. Copy the diagram and answer the following questions: [4]



i. Draw the outline of the lens (L) used.
ii. Draw a ray of light starting from B and passing through O. Show the same ray after refraction by the lens.
iii. Draw another ray from B, which after passing parallel to the principal axis, is incident on the lens and emerges after refraction from it.
iv. Locate the final image formed.

(f) (i) Give the difference between spectral and pigment colours. [2]

(ii) A green shirt is observed in blue light. What colour will it appear to be and why? [2]

(g) (i) State the transformation of energy which takes place in the following when current is drawn from them:

i. An electric cell
ii. A generator. [2]

(ii) What is a rectifier? Give a reason why the diode valve is used as a rectifier. [2]

(h) (i) You have just paid the electricity bill for your house.
a. What was that your family consumed, for which you had to pay?
b. In what unit was it measured? [2]

(ii) What quantity of heat will be produced in coil of resistance 80 ohm if current of 3A is passed through it for 4 seconds? [2]

(i) (i) What are high tension wires? Give two characteristics of these types of wires. [2]

(ii) Why is the filament of the electric iron or electric kettle put between mica sheets? [2]

(j) (i) Explain briefly how a fuse protects an electric circuit? [2]

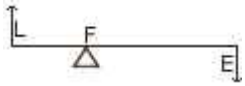
(ii) What is earthing? What is its use? [2]

SECTION II (40 Marks)

Attempt any four questions from this Section.

Question 2
(a)

i. Which class of levers has a mechanical advantage always less than one? Explain briefly with a diagram why their mechanical advantage is less than one. [2]



ii. The crow-bar is a type of lever as shown alongside: A crow bar of length 150 cm has its fulcrum at a distance of 25 cm. from the load. Calculate the mechanical advantage of this crow bar. [2]

(b) (i) What is meant by a 'faulty balance'? [1]

(ii) A machine is driven by a 100 kg mass that falls 8.0 m in 4.0 s. It lifts a load of mass 500 kg vertically upwards. [5]

i. What is the force in Newtons, exerted by the falling mass?
ii. What is the work done by 100 kg mass falling through 8·0 m?
iii. What is the power input to the machine?
iv. If efficiency of the machine is 75% or 0.75 , what is the power output of the machine?
v. What is the work done by the machine in 4.0 s? (Take g = 10 m/^{2}).

Question 3
(a)

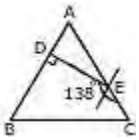
i. 2 kg of ice melts when a jet of steam at 100°C is passed through a hole drilled in a block of ice. What mass of steam was used? Given: Specific heat capacity of water = 4,200 J/kg/°C Specific latent heat of fusion of ice = 336 × 103 j/kg. Specific latent heat of vaporisation of steam = 2,268 × 103 j/kg. [4]
ii. Why does evaporation always produce cooling? [2]

(b) (i) Explain why the surroundings become pleasantly warm when water in a lake starts freezing in cold countries. [2]

(ii) If, in a central heating system, steam enters a radiator pipe at 100°C and haves the radiator pipe at 100°C, can this radiator pipe heat a room? Give an explanation for your answer. [2]

Question 4
(a) Water in a pond appears to be only three quarters of its actual depth.

i. What property of light is responsible for this observation? [1]
ii. Illustrate your answer with the help of a ray diagram. [2]



(b) (i) The critical angle for the glass of which the equilateral prism ABC is made, is 48^0. A ray of light incident on the side AB of the prism is refracted along DE such that the angle it makes with the side AC is 138°. Also, ∠EDB = 90°. Copy the diagram.
a. Draw the path of the ray incident on the side AB. (Which travels along DE.)
b. Show the path along which the ray DE travels from the point E onwards and through the side BC. [3]

(ii) Which two conditions must be fulfilled for total internal reflection of light to occur? [2]

(iii) Write the names of (1) the most sensitive; (2) the most insensitive part of the retina. [2]

Question 5
(a)

i. Under what condition does the resonance occur? [1]
ii. Why is a loud sound heard at acoustic resonance? [1]
iii. How are colour, wavelength and frequency of light dependent on one another? [2]

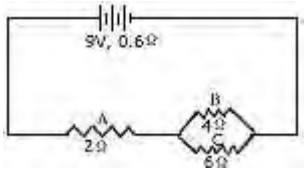
(b) (i) A certain sound has a frequency of 256 hertz and a wavelength of 1 .3 m. Calculate the speed with which these sound travels. [2]

(ii) What difference would be felt by a listener between this sound and another sound travelling at the same speed but of wavelength 2.6 m? [1]

(iii) What rays exist beyond the visible-red end of the electromagnetic spectrum? State one use and one method of detecting these rays? [3]

Question 6
(a) The diagram given shows a battery of e.m.f. 9V and internal resistance 0.6Ω connected to three resistors A, B and C.

i. Calculate the combined resistance of B and C. [1]



ii. Calculate the total resistance of A, B and C. [1]
iii. Calculate total resistance of the circuit. [1]
iv. Calculate the current in each of the three resistors—A, B and C. [3]

(b) (i) Draw a labelled diagram of the device you would use to transform 200 volts a.c. to 15 volts a.c.? [2]

(ii) What is the name of this device? [1]

(iii) State the principle on which a Voltmeter/Galvanometer works. [1]

Question 7

(a) What is an electromagnet? State two ways by which the strength of electromagnet can be increased. [3]

(b) (i) What is the main difference between fission reaction and fusion reaction? Give one example of each. [3]

(ii) An atomic nucleus denoted by ${}_{Z}X^{A}$ emits an alpha particle. Write an equation to show the formation of the daughter product. [2]

(c) Mention two properties and two uses of X-rays. [2]