BIOLOGY

2020

QUESTIONS

(Two Hours)

Answer 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 question 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 process of transformation of several glucose molecules into one molecule of starch.
- (ii) The point of attachment of two chromatids.
- (iii) The iron containing pigment in erythrocytes.
- **(iv)** The duct which transports urine from the kidney to the urinary bladder.
- (v) The part of the brain which is concerned with memory.
- **(b)** *Explain the following terms:*

[5]

- (i) Allele
- (ii) Diffusion
- (iii) Photolysis
- (iv) Phenotype
- (v) Population density
- (c) Given below are certain groups of terms. In each group the first pair indicates a relationship between the two terms. Rewrite and complete the second pair on a similar basis. [5]

Example: Cytoplasm: Cytokinesis :: Nucleus: <u>Karyokinesis</u>.

- (i) Widening of hips: Oestrogen :: Deepening of voice in males: _____
- (ii) Brain : Meninges :: Heart : _____
- (iii) Insulin : Beta-cells :: Glucagon : _____ (iv) Kidney : Renal artery :: Liver : _____
- (v) Uterus: Implantation:: Fallopian tube:

- (d) Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence beginning with the first word that is underlined: [5]
 - (i) <u>Stimulus</u>, Response, Receptor, Effector, Spinal cord.
 - (ii) <u>Root hair</u>, Endodermis, Epidermis, Xylem, Cortex.
 - (iii) <u>Conjunctiva</u>, Yellow spot, Pupil, Vitreous Humour, Aqueous Humour.
 - **(iv)** <u>Australopithecus</u>, <u>Cro-Magnon</u> Man, Homo erectus, Neanderthal Man, Homo sapiens.
 - (v) Artery, Capillaries, Venule, Vein, Arteriole.
- (e) Choose the correct answer from the four options given below: [5]
 - (i) The fusion of the sperm and ovum is termed as:
 - (A) Reproduction
- (B) Development
- (C) Fertilization
- (D) Embryo
- (ii) Agranulocytes are:
- (A) Lymphocytes, Monocytes
- (B) Lymphocytes, Basophils
- (C) Eosinophils, Basophils
- (D) Eosinophils, Monocytes
- (iii) Which of the following is not a natural reflex action?
- (A) Knee-jerk
- (B) Blinking of eyes due to strong light
- (C) Salivation at the sight of food
- (D) Sneezing when any irritant enters the nose
- **(iv)** The structural and functional units of excretion in the human kidney is the:
- (A) Ureter
- (B) Bowman's capsule
- (C) Renal pelvis
- (D) Nephron
- (v) In a human female, ovum consists of:
- (A) 23 pair of autosomes
- (B) 22 pairs of autosomes and 1 pair of sex chromosomes
- (C) 22 autosomes and 1 Y-chromosome
- (D) 22 autosomes and 1 X-chromosome
- (f) Identify the ODD term in each set and name the CATEGORY to which the remaining three belong: [5]
 - (i) Auxin, Ethylene, Adrenaline, Cytokinin
 - (ii) Tympanum, Ear ossicles, Auditory canal, Pinna
 - (iii) Syringes, Soiled dressings, Discarded needles, Houshold detergents

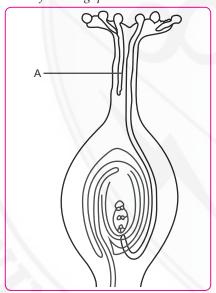
- (iv) Exophthalmic Goitre, Simple Goitre, Cretinism, Myxoedema
- (v) Adenine, Guanine, Creatinine, Cytosine
- (g) Match the items given in column A with the most appropriate ones in Column B and Rewrite the correct matching pairs: [5]

	Column A		Column B
(i)	Biston betularia		Calcium
(ii)	Testes	-1	balance of the body
(iii)	Clotting of blood	E	Light independent reaction
(iv)	Stroma	_	diffusion of gases
(v)	Stomata	-	gonad
		-	Peppered moth
		-	Light dependent reaction

(h) The diagram given below represents a plant movement.

Chlorophyll

Answer the following questions.



- (i) Name the tropic movement shown in the diagram.
- (ii) Explain the troic movement mentioned in (i).
- (iii) Label the part marked 'A'.
- (iv) What is part A attracted to?
- **(v)** Give an example of a plant which shows Thigmotropism.

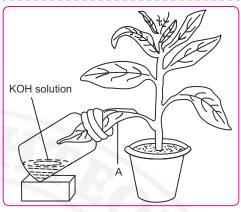
SECTION-II (40 Marks)

Attempt any four questions from this Section.

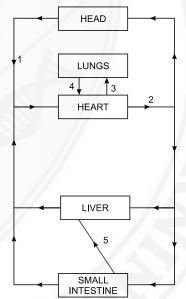
Question 2.

(a) The diagram given below represents an experiment to prove the importance of a factor in photosynthesis.

Answer the questions that follow: [5]



- (i) Which factor is being studied here?
- (ii) What is the purpose of keeping KOH in the flask?
- (iii) Explain the term Photosynthesis.
- **(iv)** What will you observe when the leaf A is tested for starch?
- **(v)** Write a well balanced chemical equation for the process of photosynthesis.
- (b) The diagram given below represents the simplified pathway of the circulation of blood. Answer the questions that follow: [5]



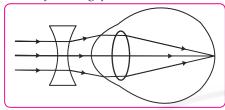
- (i) Name the blood vessels labelled 1 to 4.
- **(ii)** Which blood vessel supplies oxygenated blood to the muscles of the heart?
- (iii) What is the importance of blood vessel labelled 5?
- **(iv)** What is the type of blood circulation that takes place between the heart and the lungs?
- **(v)** Draw a diagram of the different blood cells as seen in a smear of human blood.

Question 3.

(a) The diagram given below depicts a defect of the human eye which has been corrected by using a suitable lens.

[5]

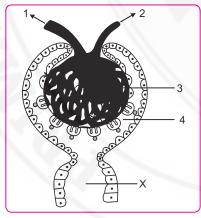
Answer the following questions:



- (i) Name the defect that has been corrected. Which type of lens has been used for the correction?
- (ii) Mention one cause for the above defect.
- (iii) Where would the image have formed if the above lens was not used for correction?
- (iv) Name the three concentric layers of the eyeball.
- (v) Draw a neat, labelled diagram of a neuron.
- **(b)** *Give the biological reasons for the following statements:*
 - (i) It is advisable to keep green plants in an aquarium.
 - (ii) Water pollution is a major cause of concern in our country.
 - (iii) We cannot distinguish colours in dim light.
 - **(iv)** Medical discoveries such as antibiotics and vaccinations have indirectly contributed to the sharp rise in human population.
 - **(v)** Homo sapiens sapiens is the most highly evolved form of man.

Question 4.

(a) The figure given below shows a part of a nephron. [5] Answer the questions that follow:

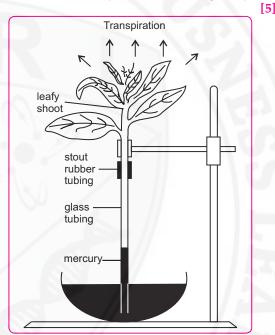


- **(i)** In which region of the kidney is the above structure present?
- (ii) Label the parts numbered 1 to 4.
- (iii) What is the technical terms for the process that occurs in part 3?
- **(iv)** Why is fluid X not called urine? Justify your answer.
- **(v)** *Draw a neat, labelled diagram of the urinary system of man.*

- (b) Differentiate between the following pairs on the basis of what is mentioned in the brackets: [5]
 - (i) Transpiration and Guttation (place of occurrence)
 - **(ii)** Biodegradable waste and Non-biodegradable waste (One example)
 - (iii) Population control and Swachh Bharat Abhiyan (One objective)
 - **(iv)** Osmosis and Active Transport (Substances undergoing movement)
 - (v) Metaphase and Anaphase (Position of chromosomes)

Question 5.

(a) The diagram below represents an experiment to demonstrate a certain phenomenon in a green plant:



(i) Will the level of mercury in the glass tubing rise or fall?

Which conducting tissue of the plant does the glass-tubing represent?

- (ii) Define Transpiration.
- (iii) How will the rate of the above process differ if the environment of the plant has:
- 1. Less humidity
- **2.** High temperature?
- **(iv)** State any two advantages of transpiration to the plant.
- (v) Draw a neat labelled diagram of a Plasmolysed cell.
- (b) Give appropriate biological/technical terms for the following: [5]
 - **(i)** The sensory organ in Cochlea.
 - (ii) Number of live births per 1000 people per year.
 - (iii) The point of contract between two neurons.
 - **(iv)** The accessory gland in human males whose secretion neutralises the acid in the vagina.

- **(v)** Condition when blood sugar level is lowered in the blood.
- (vi) Structure which helps in the adjustment of the size of the pupil.
- (vii) A surgical method of fertility control in human males.
- (viii) Process by which leucocytes migrate through the walls of capillaries.
- (ix) A sudden inheritable change in one or more genes.
- (x) A non-dividing phase of the cell cycle where more DNA is synthesised.

Question 6.

(a) State two functions of:

[5]

- **(i)** *Ear*
- (ii) Ethylene
- (iii) Tears
- (iv) Testis
- (v) Cerebellum
- **(b)** *Complete the table:*

[5]

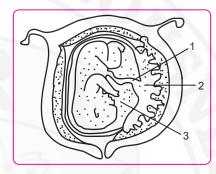
Name of the Hormone	Endocrine Gland	Function
(i)	(ii)	Deposits extra glucose of blood as glycogen
Growth Hormone	(iii)	(iv)
(v)	Thyroid	(vi)
(vii)	(viii)	Prepare body for any emergency
Oxytocin	(ix)	(x)

Question 7.

(a) A homozygous dominant tall pea plant bearing red flowers (TTRR) is crossed with a hormozygous recessive dwarf pea plant bearing white flowers (ttrr).

- (i) What is the phenotype and genotype of F_1 individuals?
- (ii) Write the possible combination of gametes that are obtained when two F_1 hybrid plants are crossed.
- (iii) Mention the phenotypic ratio of the F_2 generation.
- (iv) State Mendel's Law of Independent Assortment.
- (v) Name two X-linked disorders found in humans.
- (b) The diagram given below is that of a developing human foetus. [5]

Answer the questions that follow:



- (i) Label the parts numbered 1 to 3 in the diagram.
- **(ii)** *Mention any two functions of the part labelled 2 in the diagram.*
- (iii) Explain the significance of the part numbered 3 in the diagram.
- (iv) Define the term 'Gestation'.

What is the normal gestational period of the developing embryo?

(v) Mention the sex chromosomes in a male and female embryo.

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Polymerisation
 - (ii) Centromere
 - (iii) Haemoglobin
 - (iv) Ureter
 - (v) Cerebrum
- **(b) (i)** Allele is the alternative forms of a gene occupying the same position on the homologous chromosomes, affecting the same characteristic but in different ways.
 - (ii) Diffusion is the free movement of molecules of a substance from the region of their higher concentration to the region of their lower concentration when two are in direct contact.

- (iii) Photolysis is the process of splitting of water molecules into hydrogen ions and oxygen in presence of sunlight inside grana.
- **(iv)** Phenotype refers to the observable characteristics which are controlled genetically.
- **(v)** Population density is defined as the number of individuals per square kilometre at any given time.
- (c) (i) Testosterone
 - (ii) Pericardium
 - (iii) Alpha cells
 - (iv) Hepatic artery
 - (v) Fertilization
- (d) (i) Stimulus, receptor, spinal cord, effector, response
 - (ii) Root hair, epidermis, cortex, endodermis, xylem

- (iii) Conjunctiva, aqueous humour, pupil, vitreous humour, yellow spot
- (iv) Australopithecus, *Homo erectus*, Neanderthal man, Cro-Magnon man, *Homo sapiens*
- (v) Artery, arteriole, capillaries, venule, vein
- (e) (i) C. Fertilization
 - (ii) A. Lymphocytes, Monocytes
 - (iii) C. Salivation at the sight of food
 - (iv) D. Nephron
 - (v) D. 22 autosomes and 1 X chromosome
- (f) (i) Odd- Adrenaline; Category- Plant hormones
- (ii) Odd- Ear ossicles
 - Category- Parts of outer ear
 - (iii) Odd- Household detergents Category- Biomedical wastes
 - (iv) Odd- Exophthalmic goitre
 - Category- Conditions due to Hypothyroidism
 - (v) Odd- Creatinine
 Category- Nitrogenous bases

(g) Column A Column B

- (i) Biston betularia Peppered moth
- (ii) Testes Gonad(iii) Clotting of Calcium
- blood
 (iv) Stroma Light independent reaction
- (v) Stomata diffusion of gases
- (h) (i) Chemotropism
 - (ii) Chemotropism is the phenomenon of growth of plant organs in response to chemicals.
 - (iii) Pollen tube
 - (iv) Sugars and peptones
 - **(v)** Tendrils of Cuscuta that coils around other plants is an example of thigmotropism.

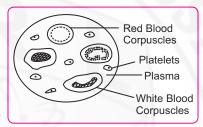
SECTION-II

Answer 2.

- (a) (i) Carbon dioxide is necessary for photosynthesis.
 - (ii) KOH absorbs carbon dioxide.
 - (iii) Photosynthesis is the process by which cells containing chlorophyll using carbon dioxide and water in presence of light energy produce glucose and release oxygen as by-product.
 - (iv) When leaf A is tested for starch for the portion inside the flask, it does not show blue-black colour indicating absence of starch whereas the portion that is outside will show blue-black colour.

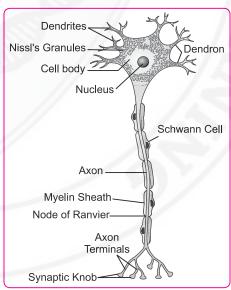
(v)
$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Chlorophy II}} \text{Sunlight} \xrightarrow{\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2}$$

- (b) (i) 1. Superior vena cava; 2. Aorta; 3. Pulmonary artery; 4. Pulmonary vein
 - (ii) Coronary artery
 - (iii) Hepatic portal vein carries the blood from stomach and intestine to liver where the excess sugar is stored as glycogen. If any toxins are present in blood, they are detoxified in liver. In this way, the quantity of nutrients flowing in the blood is regulated and circulation of toxic substances in the blood is prohibited.
 - (iv) Pulmonary circulation
 - (v)



Answer 3.

- (a) (i) Myopia, Concave lens
 - (ii) The cause of myopia is lengthening of eyeball from front to back.
 - (iii) The image would have formed in front of the retina.
 - (iv) The three concentric layers of the eyeball are sclera, choroid and retina.
 - (v)



- (b) (i) Green plants undergo photosynthesis by which oxygen gas is released which can be utilised by fishes for respiration. So, it is advisable to keep green plants in an aquarium.
 - (ii) Water pollution is the major cause of concern in our country because most of the wastes

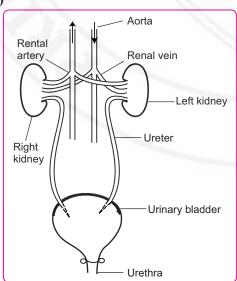
from households, industries, power plants etc. are dumped into water bodies without prior treatment. Agricultural activities, oil spills, untreated sewage water also contribute to water pollution. This leads to degradation in water quality, making it unfit for human consumption and other uses and lead to several infectious diseases. Further, decrease in oxygen level in the polluted water harm the aquatic life, leading to loss of biodiversity. All the factors results in water scarcity and making it difficult to sustain the basic needs of the large population of the country.

- (iii) In dim light, only rod cells of our eyes function, which do not respond to colour. So we cannot distinguish colours in dim light.
- (iv) Due to medical discoveries of vaccine and antibiotics, many diseases have been controlled, increasing the lifespan of the inviduals and decrease in the mortality rate. Thus, they have indirectly contributed to sharp rise in human population.
- **(v)** Homo sapiens sapiens is the most highly evolved form of man because they developed a logical and syllabic speech in order to communicate, can cultivate plants and domesticated animals, prepared tools, ornaments, used advanced agricultural techniques. They developed cities; create new survival challenges for themselves as well as other species.

Answer 4.

- (a) (i) Cortex region of kidney.
 - (ii) 1. Afferent arteriole; 2. Efferent arteriole;3. Glomerulus; 4. Bowman's capsule
 - (iii) Ultrafiltration
 - **(iv)** Fluid X is called glomerular filtrate but not urine because it is a very dilute solution that contains not only harmful wastes but also many useful substances like water, salts, glucose etc. which needs to be reabsorbed in the different parts of the nephron.





- from households, industries, power plants etc. (b) (i) Transpiration occurs mainly through the are dumped into water bodies without prior stomata of the leaves.
 - Guttation occurs through hydathodes present along the margins of the leaves.
 - (ii) Example of biodegradable waste is kitchen left overs like peels of vegetables and fruits. Example of non-biodegradable waste is plastics.
 - (iii) One objective of population control is to make people aware of the advantages of having small family so that they can get proper food, clothing, education, medical facilities.

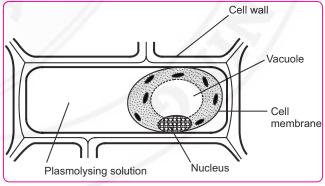
One objective of Swachh Bharat Abhiyan is to clean streets, roads, infrastructure of country's cities and towns.

- **(iv)** Osmosis is the movement of water molecules. Active transport is the movement of salts or ions.
- (v) In metaphase, chromosomes are lined up in one plane at equator of the cell.
- In Anaphase, chromosomes move towards opposite poles of the cell.

Answer 5.

- (a) (i) Mercury in the glass tube will rise. Xvlem
 - (ii) Transpiration is the loss of water in the form of water vapours from the leaves and other aerial parts of the plant.
 - (iii) 1. Less humidity increases the rate of transpiration.
 - **2.** High temperature increases the rate of transpiration.
 - (iv) Two advantages of transpiration are:
 - 1. It provides cooling effect to the plant.
 - **2.** It provides a suction force which helps in ascent of sap.

(v)



- (b) (i) Organ of Corti
 - (ii) Natality
 - (iii) Synapse
 - (iv) Prostate gland
 - (v) Hypoglycemia
 - (vi) Iris
 - (vii) Vasectomy
 - (viii) Diapedesis

- (ix) Mutation
- (x) Synthesis phase of Interphase

Answer 6.

- (a) (i) Ear- 1. It acts as a hearing organ.
 - **2.** It helps in maintaining the dynamic as well as static balance the body.
 - (ii) Ethylene- 1. It helps in ripening of fruits.
 - 2. It accelerates senescence.
 - (iii) Tears- 1. It serves as a lubricant for the surface of eye.
 - **2.** It contains an enzyme lysozyme which kills germs.
 - (iv) Testis- 1. They produce sperms.
 - **2.** They produce male hormone testosterone.
 - (v) Cerebellum- 1. It maintains balance of the body.
 - 2. It coordinates muscular activity.
- (b) (i) Insulin
 - (ii) Pancreas
 - (iii) Anterior Pituitary gland
 - **(iv)** It promotes the normal growth of the whole body.
 - (v) Thyroxine
 - (vi) It regulates the basal metabolism of the body.
 - (vii) Adrenaline
 - (viii) Adrenal gland
 - (ix) Posterior Pituitary gland
 - (x) It stimulates contraction of uterus during child birth and stimulates milk ejection.

Answer 7.

(a) (i) Phenotype is tall pea plants bearing red flowers.

Genotype is TtRr

- (ii) Possible combination of gametes is TR, tR, Tr, tr.
- (iii) Phenotypic ratio is 9:3:3:1
- (iv) Law of Independent Assortment states that the two pairs of factors in a dihybrid cross are segregated independently during gamete formation and are randomly combined in F_2 generation. Inheritance of factors controlling a particular trait in an organism is independent of the other.
- (v) Colour blindness, Haemophilia
- (b) (i) 1. Umbilical cord; 2. Placenta; 3. Amniotic fluid
 - (ii) Two functions of placenta are:
 - 1. It allows diffusion of substances like nutrients and oxygen from mother to foetus; and carbon dioxide and waste products from foetus to mother.
 - **2.** It acts as an endocrine gland and produces hormones like oestrogen and progesterone.
 - (iii) Amniotic fluid acts as a shock absorber, protecting the embryo from physical damage by jerks or mechanical shocks. It also prevents sticking of foetus to amnion.
 - (iv) Gestation is the full term of the development of the embryo in the uterus. In humans, the normal gestation period is about 280 days.
 - **(v)** In female embryo, XX sex chromosome is present whereas in male, XY is present.

BIOLOGY

2019

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- (i) The layer of eyeball that provides nourishment to the eye.
- (ii) One gaseous compound which depletes the ozone layer.
- (iii) The structure which connects the placenta and the foetus.
- **(iv)** A pair of corresponding chromosomes of the same shape and size and derived one from each parent.
- (v) The compound formed when haemoglobin combines with carbon dioxide in blood.
- (b) Correct and rewrite the statement by changing the biological term that is underlined for each statement:
 - **(i)** The theory of Inheritance of Acquired characters was proposed by <u>Watson and Crick</u>.
 - (ii) The protective sac which develops around the developing embryo is called the <u>Pericardium</u>.
 - **(iii)** *Maintaining balance of the body and coordinating muscular activities is carried out by the <u>cerebrum</u> .*
 - (iv) The kidney is composed of number of <u>neurons</u>.
 - **(v)** The part of the eye which can be donated from a clinically dead person is the <u>Retina</u>.
- (c) Give suitable biological reasons for the following statements: [5]
 - (i) The birth rate in India is very high.
 - (ii) Carbon monoxide is dangerous when inhaled.
 - (iii) Root hairs become flaccid and droop when excess fertilizers are added to the moist soil around them.
 - (iv) Acid rain is harmful to the environment.
 - (v) All life on Earth is supported by Photosynthesis.
- (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	Column B
(i) Cranial nerves	Testosterone
(ii) Leydig cells	Natural reflex
(iii) Acetylcholine	12 pairs
(iv) Spinal nerves	Prolactin

(v) Sneezing	Neurotransmitter
41 //1/	18 pairs
	31 pairs
	Conditioned reflex

- (e) Choose the correct answer from 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
- (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
- (iii) A muscular wall is absent in:
- (A) Capillary
- (B) Venule
- (C) Arteriole
- (D) Vein
- **(iv)** On which day of the menstrual cycle does ovulation take place?
- (A) 5th day
- (B) 28^{th} day
- (C) 14^{th} day
- (D) 1^{st} 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
- (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
- (ii) Insulin, Adernaline, Pepsin, Thyroxine.
- (iii) Axon, Dendron, Photon, Cyton.
- (iv) Chicken, Pox, Colour blindness, Haemophilia, Albinism.
- (v) Polythene bag, Crop residue, Animal waste, Decaying vegetable.

- **(g)** *Expand the following biological abbreviations.*
 - **(i)** *ABA*
- (ii) IAA
- (iii) ATP
- (iv) DNA
- **(v)** *TSH*
- **(h)** Study the picture given below and answer the following questions: [5]



- (i) Identify the type of pollution.
- (ii) Name one pollutant that causes the above pollution.
- (iii) Mention the impact of this pollution on human health.
- (iv) State one measure to control this pollution.
- (v) What is a 'Pollutant'? Explain the term.

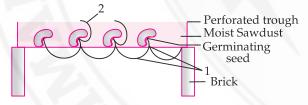
SECTION-II (40 Marks)

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

Question 2.

(a) Given below is an experimental set up to demonstrate a particular tropic movement in germinating seeds. Study the diagram and answer the questions that follow:

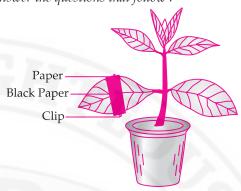
[5]



- (i) Label the parts 1 and 2.
- (ii) Name the tropic movement shown by part 1.
- (iii) Part 1 is affected by two stimuli. Name them. Which one of the two is stronger?
- **(iv)** What is Thigmotropism? Give one example.
- (v) What is meant by 'Positive' and 'Negative' tropic movements in plants?
- **(b)** *Mention the exact location of the following :*
 - (i) Testis
 - (ii) Incus
 - (iii) Thylakoids
 - (iv) Amniotic fluid
 - (v) Corpus callosum

[5] Question 3.

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

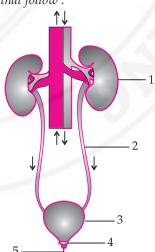


- (i) Name the factor studied in this experiment.
- **(ii)** What will you observe in the experimental leaf after the starch test?
- (iii) Explain the process of Photosynthesis.
- **(iv)** Give a balanced chemical equation to represent the process of photosynthesis.
- **(v)** Draw a neat, labelled diagram of an experimental setup to show that oxygen is released during photosynthesis.
- **(b)** *State the main function of the following :*
- [5]

- (i) Medulla Oblongata
- (ii) Cytokinins
- (iii) Tears
- (iv) Coronary Artery
- (v) Seminal Vesicles.

Question 4.

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

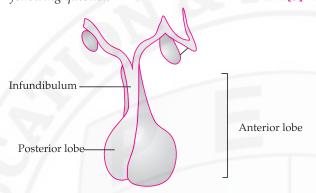


- (i) *Identify the system.*
- **(ii)** Label the parts marked 2 and 4. Mention the function of part 5.

[5]

- (iii) Name the structural and functional units of the part marked 1.
- (iv) What is the fluid that accumulates in part 3? Which is the main nitrogenous waste present in it?
- **(v)** Draw a neat, labelled diagram showing the longitudinal section of part 1.
- (b) The diagram given below represent an endocrine gland in the human body. Study the diagram and answer the following question:

 [5]
- (ii) Why was the pot enclosed in a rubber sheet?
- (iii) Mention two external factors which can accelerate the above process.
- **(iv)** *List two adaptations in plants to reduce the above process.*
- (v) Draw a neat, labelled diagram of a stomatal apparatus.
- (b) Given below are two stages in the evolution of man.Study them and answer the questions than follow: [5]



- **(i)** *Identify the endocrine gland. Where is it located?*
- (ii) Why is the above gland referred to as the 'Master gland'?
- (iii) Name the hormone which in deficiency causes Diabetes Insipidus.

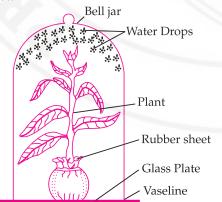
How does this disorder differ from Diabetes Mellitus? **(iv)** Explain the term 'Hormone'.

What is the role of Tropic hormones in the human body?

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

Question 5.

(a) Given below 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:



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

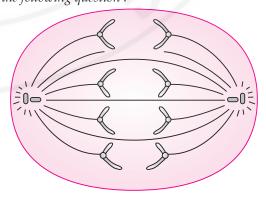




- **(i)** *Identify Australopithecius and Neanderthal man from the above pictures.*
- (ii) Mention two characteristic features each for the two stages.
- (iii) Who proposed the theory of 'Natural Selection'?
- **(iv)** Name the organism used as an example to explain 'Industrial Melanism'.
- (v) Give two examples of Vestigial organs in humans.

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?
 - **(ii)** Draw a punnett square board to show the gametes and offspring when both the parents are heterozygous for tallness.
 - (iii) What is the phenotypic ratio and genotypic ratio of the above cross in (ii)?
 - (iv) State Mendel's Law of Dominance.
 - **(v)** What is Dihybrid Cross?
- (b) Given below is a diagram representing a stage during the mitotic cell division. Study the diagram and answer the following question: [5]

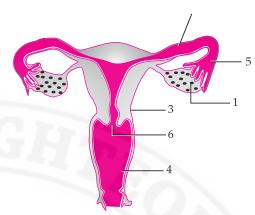


(i) *Identify the stage by giving a suitable reason.*

- (ii) Is it a plant or an animal cell? Give a reason to support your answer.
- (iii) Draw a neat, labelled diagram of the stage which follows the one shown in the diagram.
- **(iv)** How many chromosomes will each daughter cell have after the completion of the above division?
- (v) Name of the nitrogenous bases.

Question 7.

- (a) Answer the following questions briefly:
 - (i) How are the cytons and axons placed in the brain and the spinal cord?
 - (ii) Which part of the human ear gives 'Dynamic balance' and 'Static balance' to the body?
 - (iii) Explain how the human eye adapts itself to bright light and dim light.
 - (iv) What is Parthenocarpy? Give one example.
 - **(v)** Mention any two objectives of 'Swachh Bharat Abhiyan'.
- **(b)** The diagram given below represent a system in the human body.
 - Study the diagram and answer the following questions: [5]



- (i) *Identify the system.*
- (ii) Label the parts marked 5 and 6.
- (iii) Name the two hormones secreted by 1.
- **(iv)** Mention the number and the name of the part involved in fertilization and implantation from the above diagram.
- (v) Mention the surgical methods of contraception in:
- 1. Human males
- 2. Human females.

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Choroid layer
 - (ii) CFCs [Chlorofluorocarbons] or CCl₄
 - (iii) Umbilical cord
 - (iv) Homologous chromosomes
 - (v) Carbamino-haemoglobin/HbCO₂
- **(b) (i)** The theory of Inheritance of Acquired characters was proposed by **Lamarck.**
 - (ii) The protective sac which develops around the developing embryo is called the **Amnion**.
 - (iii) Maintaining balance of the body and coordinating muscular activities is carried out by the **Cerebellum.**
 - **(iv)** The kidney is composed of number of **Nephrons** Uriniferous tubules.
 - (v) The part of the eye which can be donated from a clinically dead person is the **Cornea**.
- (c) (i) Most of the people who belong to rural area are illiterate, superstitious and ignorant. They don't know much about the function of reproductive system and use of contraceptives which is the major reason for population explosion in India. They consider children as the gift of god and a sign of prosperity. Desire for a male child is another important reason.
 - (ii) Haemoglobin has a very strong affinity for Carbon monoxide and a stable compound called

Carboxy-haemoglobin (HbCO) is formed when carbon monoxide is inhaled. It cuts down the capacity of blood to transport oxygen which may lead to death. Hence it is very dangerous to inhale carbon monoxide.

- (iii) When excess fertilizers are added to moist soil, solute concentration increases, making the soil a hypertonic solution, in turn outward flow of water occurs from root hair cells causing plasmolysis of cell. Hence root hairs become flaccid and droop down.
- **(iv)** Acid rain has oxides of nitrogen and sulphur dissolved in it which decreases its pH value thus making it acidic. This damages vegetation, corrodes monuments, statues, buildings etc., and also causes harm to human health, aquatic life and crops and pollutes soil.
- (v) Our food chain starts with producers *i.e.* green plants as they are the only organisms which can prepare their own food by photosynthesis process. All other living organisms depend upon them directly or indirectly for food. Photosynthesis is thus the process by which oxygen is released to our atmosphere which is a life supporting gas. So we can say that directly or indirectly all life on Earth is supported by photosynthesis.

1	Column A	Column B
	(i) Cranial nerves	12 pairs
	(ii) Leydig cells	Testosterone

(d)

(iii) Acetylcholine	Neurotransmitter
(iv) Spinal nerves	31 pairs
(v) Sneezing	Natural reflex

- **(e) (i) (C)** Artery
 - (ii) (D) Either X or Y chromosome
 - (iii) (A) Capillary
 - (iv) (C) 14th day
 - (v) (D) Age of the plant
- (f) (i) Odd- Leukemia

Category- The rest are Hormonal disorders.

(ii) Odd-Pepsin

Category- Others are Hormones while pepsin is an enzyme.

(iii) Odd- Photon

Category- The rest are parts of a neuron.

(iv) Odd- Chicken pox

Category- Others are genetic disorders.

(v) Odd-Polythene bag

Category- Others are Biodegradable pollutants.

- (g) (i) Abscisic Acid
 - (ii) Indole 3-Acetic Acid
 - (iii) Adenosine Triphosphate
 - (iv) Deoxyribonucleic Acid
 - (v) Thyroid Stimulating Hormone
- (h) (i) Water Pollution
 - (ii) Detergents, Sewage, Domestic waste causes water pollution.
 - (iii) Water pollution can cause various health hazards in human beings like jaundice, typhoid, cholera and diarrhoea.
 - **(iv)** Industrial effluents should be treated before disposing them into water bodies. Sewage treatment plants should be set up to treat sewage as well recycling plastic, metal.
 - (v) Pollutant is any constituent which when added to water or soil or air brings about undesirable effect on environment affecting the life of living organisms. In other words, any element or constituent that pollutes either soil, water or air is called pollutant.

SECTION-II

Answer 2.

- (a) (i) 1. Radicle; 2. Plumule
 - (ii) Hydrotropism
 - (iii) The two stimuli are water/moisture and gravity of earth.

Water is a stronger stimulus as compared to earth's gravity.

- **(iv)** Thigmotropism is the growth movement of plants in response to touch stimulus. Example-The tendrils of *Cuscuta* coil around a support in response to touch.
- (v) If the growth movement of plant parts is towards the stimuli then the plant shows positive tropic movement but if the growth movement of plant parts is away from the stimuli then it shows negative tropic movement.
- (b) (i) Testes are located in thin walled sac like structure called Scrotal Sac.
 - (ii) Incus is the middle of the three bones of ear ossicles which is connected to Malleus on one end and Stapes on other end and is present in the middle ear of human beings.
 - (iii) Thylakoids are closely packed flattened sacs found in the stroma of chloroplast.
 - **(iv)** Amniotic fluid is found in the amnion. It fills the space between amnion and foetus.
 - **(v)** Corpus callosum is a bridge of nerve fibres which connects the two cerebral hemispheres.

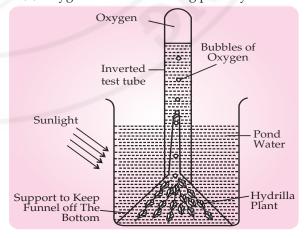
Answer 3.

(a) (i) Sunlight

- (ii) After the starch test, we observe that the parts of leaf which remains uncovered will turn to blueblack colour indicating the presence of starch, but the covered portion of the leaf will turn brown in colour which indicates the absence of starch.
- (iii) Photosynthesis is the process by which chlorophyll containing cells in the presence of suitable factors like water, carbon dioxide, sunlight prepare glucose and release oxygen gas into the atmosphere as a by-product.
- (iv) The balanced chemical equation representing photosynthesis process is as follows-

$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{light energy}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$

(v) Oxygen is released during photosynthesis.



- (b) (i) Medulla oblongata controls the activity of internal organs and other involuntary functions like beating of heart, peristaltic movement, breathing movement etc.
 - (ii) Cytokinins stimulate plant growth by cell division and cell enlargement. They inhibit apical dominance, prevents ageing, breaks seed dormancy, delays senescence.
 - (iii) Tears clean the front surface of our eye by removing dust particles and the enzyme lysozyme present in tears, kills the germs.
 - (iv) Coronary artery supplies oxygenated blood to heart muscles.
 - **(v)** The secretion from seminal vesicles activates the sperms and provides a medium for their transportation.

Answer 4.

- (a) (i) Excretory system
 - (ii) 2. Ureter; 4. Sphincter Muscle,

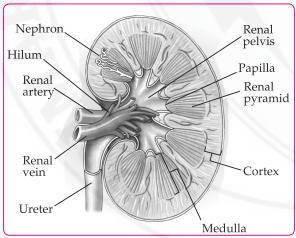
The structure labelled as 5 is urethra.

Urethra empties the urinary bladder at regular intervals *i.e.*, carries the urine from the bladder to outside of the body.

(iii) The structure labelled as 1 is Kidney.

The structural and functional unit of kidney is a nephron.

- **(iv)** Urine gets accumulated in Urinary bladder[part 3]. Urea is the main nitrogenous waste present in urine.
- (v) Diagram of longitudinal Section of kidney.



- (b) (i) It is pituitary gland. It is located in the brain between hypothalamus and pineal gland.
 - (ii) Pituitary gland is called the Master gland as it controls the functions of other endocrine glands and also the main body functions such as growth.
 - (iii) Hormone is ADH/Vasopressin.

In Diabetes insipidus there is no sugar in urine but it is pale, in Diabetes mellitus sugar is present in urine. **(iv)** Hormones are chemical secretions from specific glands which are poured directly into blood stream and produce effect in one or more target organs only.

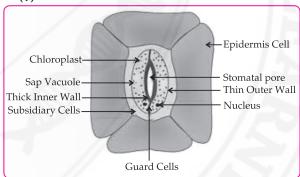
Tropic hormones stimulate other glands for the production of some other hormones. For example-TSH [Thyroid stimulating hormone] stimulates thyroid gland to secrete thyroxine.

- (v) 1. Posterior lobe or neurohypophysis
- 2. Anterior lobe or adenohypophysis
- 3. Anterior lobe or adenohypophysis

Answer 5.

- (a) (i) Transpiration is the process being studied. It is the process by which water is lost in form of water vapour from leaves and other aerial part of the plant.
 - (ii) The pot was enclosed in a rubber sheet to prevent the escape of water in form of vapour from the pot.
 - (iii) Temperature and velocity of wind. If both temperature and wind velocity are high then process of transpiration increases.
 - (iv) Adaptations in plants to reduce transpiration:
 - **1.** The stomata may be sunken or covered by hairs or their number may be reduced.
 - 2. The leaves may become narrower.
 - 3. The leaves may be covered with thick cuticle.

(v)



Stomatal Apparatus

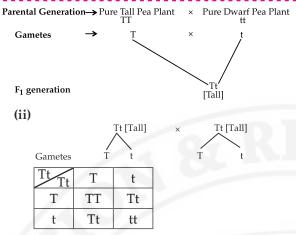
- (b) (i) A- Neanderthal man, B- Australopithecus
 - (ii) Characteristics features of Neanderthal man (A)—
 - 1. Less hair on body, Large head.
 - 2. Large cranial capacity 1500 cm³.

Characteristics features of Australopithecus (B)—

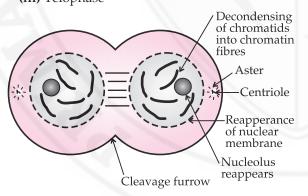
- 1. Chin absent, prominent eyebraws ridges...
- 2. Cranial capacity of 450-600 cm³.
- (iii) Charles Darwin.
- (iv) Peppered moth-Biston betularia
- (v) Wisdom teeth, Vermiform appendix.

Answer 6

(a) (i) In F1 generation, phenotype of the plants will be Tall and genotype is Tt. (hetrozygous dominant)



- (ii) Phenotypic ratio is 3 : 1 Genotypic ratio is 1 : 2 : 1
- (iv) Law of Dominance: It states that in a cross between pure breeding lines out of the pair of contrasting characters, the one that is expressed in first generation is dominant and the one that is not expressed is recessive. Only dominant trait is expressed in first generation.
- **(v)** Dihybrid cross is a cross between two pure breeding different varieties of organisms considering alternative traits of two different characters.
- (b) (i) It is anaphase stage of mitosis as the two sister chromatids are separated from each other and moving towards opposite poles by contraction of spindle fibres.
 - (ii) It is an animal cell as there is presence of centrioles and formation of aster, cellwall absent.
 - (iii) Telophase

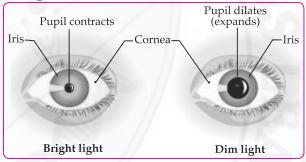


- (iv) Each daughter cell shall have 4 chromosomes as in mitosis process, the number of chromosome remains constant.
- (v) Adenine, Guanine, Cytosine, Thymine.

Answer 7.

- (a) (i) Axons are placed in inner portion whereas cytons are placed in outer portion of brain but in spinal cord, axons are placed in outer side and cell bodies/cytons are placed in the inner portions.
 - (ii) Sensory cells in semi-circular canals are concerned with dynamic balance of the body. Sensory patches in Utriculus and Sacculus are concerned with static balance of the body.
 - (iii) When we move from a brightly lighted area to a dark room *i.e.*, in dim light, we experience difficulty in seeing objects for some time. Slowly, our vision is improved. This is called dark adaptation. The pupil dilates to allow more light to enter the eyes and rhodopsin/visual purple is generated.

When we enter a brightly lighted area after being in a dimly lit area for a period of time, we experience a dazzling light for short period after which our vision improves. This is called the light adaptation. Pupil constricts to allow less light to enter our eyes and rhodopsin pigment is degenerate.



- **(iv)** Development of fruits without fertilization is called Parthenocarpy. Example- Banana, Apple.
- (v) Two objectives of Swachh Bharat Abhiyan are-
- **1.** To eliminate open defecation by building individual and public toilets even in the remotest areas.
- **2.** To make our villages, cities and towns clean by removing wastes from streets, roads, parks, gardens, houses etc.
- (b) (i) Female reproductive system
 - (ii) 5. Oviducal funnel; 6. Cervix
 - (iii) Ovary secretes Oestrogen and Progesterone.
 - (iv) Oviduct [part 2] is the site of fertilization and uterus [part 3] is site of implantation.
 - (v) 1. Vasectomy in males
 - 2. Tubectomy in females.

BIOLOGY

2018

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- (i) The organisation which procures and supplies blood during an emergency.**
- (ii) The blood vessel which supplies blood to the liver.
- (iii) The number of chromosomes present in a nerve cell of a human being.
- **(iv)** *The layer of the eyeball that forms the transparent Cornea.*
- **(v)** The wax-like layer on the epidermis of leaves which reduces transpiration.
- (b) Choose the correct answer from each of the four options given below: [5]
 - **(i)** The number of Spinal nerves in a human being are:
 - (A) 31 pairs
- (B) 10 pairs
- (C) 21 pairs
- (D) 30 pairs
- (ii) Which one of the following is non-biodegradable?
- (A) DDT
- (B) Vegetable peel
- (C) Cardboard
- (D) Bark of trees
- (iii) Aqueous humour is present between the:
- (A) Lens and Retina
- (B) Iris and Lens
- (C) Cornea and Iris
- (D) Cornea and Lens
- (iv) A strong chemical substance which is used on objects and surfaces in our surroundings to kill germs: **
- (A) Cresol
- (B) Carbolic acid
- (C) Iodine
- (D) Mercurochrome
- **(v)** Which one of the following is a Greenhouse gas?
- (A) Oxygen
- (B) Methane
- (C) Sulphur dioxide
- (D) Nitrogen
- ** Answer is not given due to change in the present syllabus.

c)	Complete the following paragraph by filling in the
	blanks (i) to (v) with appropriate words: [5]
	To test a leaf for starch, the leaf is boiled in water to
	(i) It is then boiled in Methylated spirit
	to (ii) The leaf is dipped in warm water to
	soften it. It is placed in a petri dish, and (iii)
	solution is added. The region of the leaf which contains
	starch, turns (iv) and the region which does
	not contain starch, turns (v)

(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	Column B
(i)	Cretinism	(a) Hypersecretion of adrenal cortex
(ii)	Diabetes insipidus	(b) Hyposecretion of Thyroxine
(iii)	Exophthalmic Goitre	(c) Hyposecretion of growth hormone
(iv)	Adrenal virilism	(d) Hyposecretion of Vasopressin
(v)	Dwarfism	(e) Hyposecretion of adrenal cortex
		(f) Hypersecretion of Growth hormone
Ü		(g) Hypersecretion of Thyroxine

- (e) Correct the following statements by changing the underlined words: [5]
 - **(i)** Normal pale yellow colour of the urine is due to the presence of the pigment <u>Melanin</u>.
 - (ii) The outermost layer of Meninges is Pia mater.
 - (iii) The cell sap of root hair is <u>Hypotonic</u>.
 - **(iv)** <u>Xylem</u> transports starch from the leaves to all parts of the plant body.
 - (v) <u>Nitrogen</u> bonds are present between the complementary nitrogenous bases of DNA.
- (f) Choose between the two options to answer the question specified in the brackets for the following:[5] An example is illustrated below.

Example: Corolla or Calyx (Which is the outer whorl?)

Answer: Calyx

- (i) Blood in the renal artery or renal vein (Which one has more urea?)
- (ii) Perilymph or endolymph (Which one surrounds the organ of Corti?)
- (iii) Lenticels or stomata (Which one remains open always?)
- **(iv)** Sclerotic layer or choroid layer (Which one forms the Iris?)
- **(v)** Blood in the pulmonary artery or pulmonary vein (Which one contains less oxyhaemoglobin?)
- **(g)** *Given below is a representation of a type of pollution.*

Study the picture and answer the questions:



- (i) Name the type of pollution shown in the picture.
- (ii) Name one source of this pollution.
- (iii) How does this pollution affect human health?
- (iv) Write one measure to reduce this pollution.
- **(v)** State one gaseous compound that leads to the depletion of the ozone layer and creates 'Ozone holes'.
- (h) Choose the ODD one out from the following terms given and name the CATEGORY to which the others belong: [5]

Example: Nose, Tongue, Arm, Eye.

Answer : *Odd Term – Arm, Category – Sense organs*

- (i) Detergents, X-rays, sewage, oil spills.
- (ii) Lumen, muscular tissue, connective tissue, pericardium.
- (iii) Dendrites, Medullary Sheath, Axon, Spinal cord.
- (iv) Centrosome, Cell wall, Cell membrane, Large vacuoles.
- **(v)** Prostate gland, Cowper's gland, seminal vesicle, seminiferous tubules.

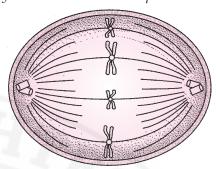
SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

(a) The diagram given below represents a stage during cell division. [5]

Study the same and answer the questions that follow:



- **(i)** *Identify whether it is a plant cell or an animal cell. Give a reason in support of your answer.*
- (ii) Name the stage depicted in the diagram.

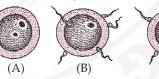
What is the unique feature observed in this stage?

- (iii) Name the type of cell division that occurs during:
- 1. Replacement of old leaves by new ones.
- 2. Formation of gametes.
- **(iv)** What is the stage that comes before the stage shown in the diagram?
- **(v)** Draw a neat, labelled diagram of the stage mentioned in **(iv)** above keeping the chromosome number constant.
- **(b)** *Mention the exact location of the following :*
 - (i) Epididymis
 - (ii) Lacrimal gland
 - (iii) Malleus
 - (iv) Hydathodes
 - (v) Pulmonary semilunar valve

Question 3.

(a) Given below are diagrams showing the different stages in the process of fertilisation of an egg in the human female reproductive tract. [5]

Study the diagrams and answer the questions:



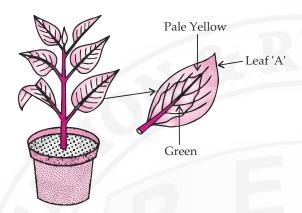




[5]

- (i) Arrange the letters given below each diagram in a logical sequence to show the correct order in the process of fertilisation.
- (ii) Where does fertilisation normally take place? What is 'Implantation' that follows fertilisation?
- (iii) Mention the chromosome number of the egg and zygote in humans.
- **(iv)** Explain the term 'Gestation'. How long does Gestation last in humans?
- **(v)** *Draw a neat, labelled diagram of a mature human sperm.*

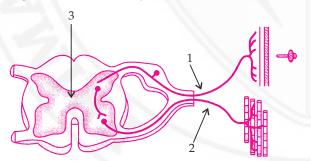
(b) A potted plant with variegated leaves was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours and then placed in bright sunlight for a few hours. Observe the diagrams and answer the questions. [5]



- **(i)** What aspect of photosynthesis is being tested in the above diagram?
- (ii) Represent the process of photosynthesis in the form of a balanced equation.
- (iii) Why was the plant kept in the dark before beginning the experiment?
- (iv) What will be the result of the starch test performed on leaf 'A' shown in the diagram? Give an example of a plant with variegated leaves.
- (v) Draw a neat labelled diagram of a chloroplast.

Question 4.

(a) The diagram given below shows the internal structure of a spinal cord depicting a phenomenon. Study the diagram and answer the questions: [5]

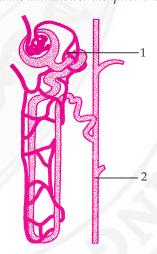


- **(i)** Name the phenomenon that is depicted in the diagram. Define the phenomenon.
- **(ii)** Give the technical term for the point of contact between the two nerve cells.
- (iii) Name the parts numbered 1, 2 and 3.
- **(iv)** How does the arrangement of neurons in the spinal cord differ from that of the brain?
- **(v)** Mention two ways by which the spinal cord is protected in our body.

- (b) A potted plant with variegated leaves was taken in order to prove a factor necessary for photosynthesis. (b) Give appropriate biological or technical terms for the following: [5]
 - **(i)** Process of maintaining water and salt balance in the blood.
 - **(ii)** Hormones which regulate the secretion of other endocrine glands.
 - (iii) Movement of molecules of a substance from their higher concentration to lower concentration when they are in direct contact.
 - **(iv)** The condition in which a pair of chromosomes carry similar alleles of a particular character.
 - **(v)** The complex consisting of a DNA strand and a core of histones.
 - (vi) The onset of menstruation in a young girl.
 - **(vii)** Squeezing out of white blood cells from the capillaries into the surrounding tissues.
 - (viii) The fluid which surrounds the foetus.
 - (ix) The relaxation phase of the heart.
 - (x) The difference between the birth rate and the death rate.

Question 5.

(a) The diagram given below is that of a structure present in a human kidney.[5] Study the same and answer the questions that follow:

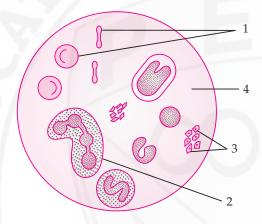


- (i) Name the structure represented in the diagram.
- (ii) What is the liquid entering part '1' called? Name two substances present in this liquid that are reabsorbed in the tubule.
- (iii) What is the fluid that comes to part '2' called? Name the main nitrogenous waste in it.
- **(iv)** Mention the three main steps involved in the formation of the fluid mentioned in **(iii)** above.
- **(v)** Name the substance which may be present in the fluid in part '2' if a person suffers from Diabetes mellitus.

- (b) Differentiate between the following pairs on the basis of what is indicated in the brackets: [5]
 - (i) Leaf and Liver [form in which glucose is stored]
 - (ii) ATP and AIDS [expand the abbreviations]
 - (iii) Testosterone and Oestrogen [organ which secretes]
 - (iv) Ureter and Urethra [function]
 - **(v)** Hypotonic solution and Hypertonic solution [condition of a plant cell when placed in them]

Question 6.

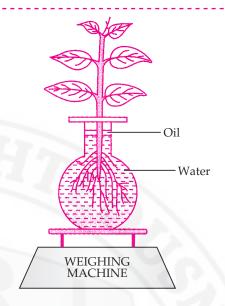
(a) Given below is a diagram of a human blood smear. [5] Study the diagram and answer the questions that follow:



- (i) Name the components numbered '1' to '4'.
- (ii) Mention two structural differences between the parts '1' and '2'.
- (iii) Name the soluble protein found in part '4' which forms insoluble threads during clotting of blood.
- **(iv)** What is the average lifespan of the component numbered '1'?
- (v) Component numbered '1' do not have certain organelles but are very efficient in their function. Explain.
- (b) Give biological explanations for the following: [5]
 - **(i)** Education is very important for population control.
 - (ii) The placenta is an important structure for the development of a foetus.
 - (iii) All the food chains begin with green plants.
 - **(iv)** Plants growing in fertilized soil are often found to wilt if the soil is not adequately watered.
 - (v) We should not put sharp objects into our ears.

Question 7.

(a) The diagram below represents a process in plants. [5] The setup was placed in bright sunlight. Answer the following questions:



(i) Name the physiological process depicted in the diagram.

Why was oil added to the water?

(ii) When placed in bright sunlight for four hours, what do you observe with regard to the initial and final weight of the plant?

Give a suitable reason for your answer.

- (iii) What happens to the level of water when this setup is placed in:
- 1. Humid conditions?
- **2.** Windy conditions?
- **(iv)** *Mention any three adaptations found in plants to overcome the process mentioned in (i).*
- (v) Explain the term 'Guttation'.
- b) A pea plant which is homozygous for Green pods which are inflated [GGII] is crossed with a homozygous plant for yellow pods which are constricted [ggii]. Answer the following questions:
 - (i) Give the phenotype and genotype of the F_1 generation.

Which type of pollination has occurred to produce F_1 generation?

- (ii) Write the phenotypic ratio of the F_2 generation.
- (iii) Write the possible combinations of the gametes that can be obtained if two F_1 hybrid plants are crossed.
- (iv) State Mendel's law of 'Segregation of Gametes'.
- **(v)** What is the scientific name of the plant which Mendel used for his experiments on inheritance?

ANSWERS

SECTION-I

Answer 1.

- (a) (ii) Hepatic artery (iii) 46 (iv) Sclera/sclerotic layer (v) Cuticle
- (b) (i) (A) 31 pairs (ii) (A) DDT (iii) (D) Cornea and lens (v) (B) Methane
- (c) (i) Kill the cells
 - (ii) Remove chlorophyll (iii) Iodine
 - (iv)Blue-black
- (v) Yellowish Brown

(d)

Column A	Column B
(i) Cretinism	(b) Hyposecretion of Thyroxine
(ii) Diabetes insipidus	(d) Hyposecretion of Vasopressin
(iii)Exophthalmic Goitre	(g) Hypersecretion of Thyroxine
(iv) Adrenal virilism	(a) Hypersecretion of adrenal cortex
(v) Dwarfism	(c) Hyposecretion of growth hormone

- (e) (i) Normal pale yellow colour of the urine is due to the presence of the pigment **Urochrome**.
 - (ii) The outermost layer of Meninges is **Dura** mater.
 - (iii) The cell sap of root hair is Hypertonic.
 - **(iv) Phloem** transports starch from the leaves to all parts of the plant body.
 - **(v) Hydrogen** bonds are present between the complementary nitrogenous bases of DNA.
- (f) (i) Blood in renal artery
 - (ii) Endolymph
 - (iii) Lenticels
 - (iv) Choroid layer
 - (v) Blood in the pulmonary artery
- (g) (i) Air pollution
 - (ii) Gases emitted from factories, industries and automobile exhausts.
 - (iii) Air pollution causes respiratory problems and lung disorders like bronchitis. It also leads to poor visibility and asthma.
 - (iv) Installation of tall chimneys in factories and chimneys should be fitted with filters and electrostatic precipitators. Also, use of efficient engines, unleaded petrol and CNG in automobiles help to reduce air pollution.
 - (v) CFCs (chlorofluorocarbons)
- (h) (i) Odd one : X-rays

Category: Water pollutants.

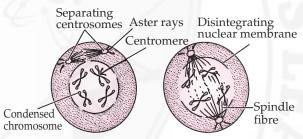
- (ii) Odd one : Lumen
 - **Category**: Type of tissues
- (iii) Odd one : Spinal cord
 - **Category**: Parts of neuron.
- (iv) Odd one : Centrosome
 - **Category**: Parts of a plant cell.
- (v) Odd one : Seminiferous tubules
 - Category: Accessory glands of human

male reproductive system.

SECTION-II

Answer 2.

- (a) (i) It is an animal cell as centrioles are present.
 - (ii) Metaphase of mitosis
 - All the duplicated chromosomes are aligned on the equatorial plane and the chromosomes are attached to the spindle fibres through centromere.
 - (iii) 1. Mitosis
- 2. Meiosis
- (iv) Prophase
- (v)



Early Prophase

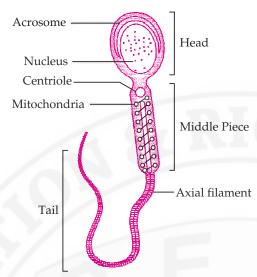
Late Prophase

- **(b) (i) Epididymis** : Inside the scrotum and on upper pole of testis.
 - (ii) Lacrimal glands: At the upper sideward portion of the orbit of eyes.
 - (iii) Malleus: In the middle ear between the tympanic membrane and the incus.
 - (iv) Hydathodes: On the edges and tips of leaves.
 - **(v) Pulmonary semilunar valves :** At the opening of right ventricle into the pulmonary artery.

Answer 3.

- (a) (i) $D \rightarrow C \rightarrow B \rightarrow A$.
 - (ii) Fertilisation normally takes place in oviduct (fallopian tube). Implantation is the process of fixing of blastocyst to the wall of uterus.
 - (iii) Chromosome number of egg 23
 - Chromosome number of zygote 46
 - (iv) The full term of development of an embryo in the uterus is called gestation. It is about 280 days in the humans.

(v)

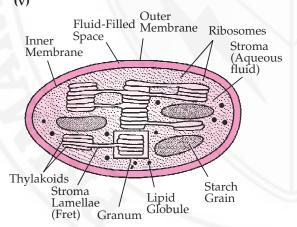


(b) (i) Chlorophyll is necessary for photosynthesis.

(ii)
$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$

- (iii) Plant was kept in dark to destarch the leaves so that the starch already present in the plant does not interfere with the results of the experiment.
- **(iv)** The green portion of the leaf will turn blueblack, indicating the presence of starch and the pale yellow portion of the leaf will turn brown, indicating the absence of starch.

Example of plant with variegated leaves : Croton.



Answer 4.

- (a) (i) Reflex action. It is an automatic, quick and involuntary action in the body brought about by a stimulus.
 - (ii) Synapse
 - (iii) 1. Sensory neuron, 2. Motor neuron, 3. Gray matter.
 - (iv) In spinal cord, the gray matter containing the cell bodies of neurons lies on inner side and white matter containing myelinated axons on outer side, whereas, in the brain, gray matter is outside and white matter lies on inner side.

- **(v) 1.**Spinal cord is covered by three membranous layer of meninges which protects it and also its central canal is filled with cerebrospinal fluid which absorbs shocks.
- **2.** It is also protected by the vertebrae of backbone.
- (b) (i) Osmoregulation
- (ii) Tropic hormones
- (iii) Diffusion
- (iv) Homozygous
- (v) Nucleosome
- (vi) Menarche
- (vii) Diapedesis
- (viii) Amniotic fluid
- (ix) Diastole
- (x) Growth rate of population

Answer 5.

- (a) (i) Nephron/uriniferous tubule/renal tubule.
 - (ii) Glomerular filtrate

Two substances present in glomerular filtrate are water and glucose.

(iii) Urine

Urea is the main nitrogenous waste in urine.

- **(iv)** Ultrafiltration, selective reabsorption, tubular secretion and Glomerular fillration.
- (v) Glucose
- (b) (i)

Leaf	Liver
Glucose is stored in	Glucose is stored in
the form of starch.	the form of glycogen.

(ii)

ATP	AIDS
Adenosine	Acquired immune
triphosphate	deficiency syndrome.

(iii)

Testosterone	Oestrogen
Testosterone is secreted by leydig cells, present in the testes.	

(iv)

Ureter	Urethra
Ureter carries urine from kidneys to the urinary bladder.	Urethra carries urine from urinary bladder to the outside of the body.

(v)

Hypotonic solution	Hypertonic solution
When a cell is placed	When a cell is placed
in hypotonic solution,	in hypertonic solution,
it gets swollen up and	
the condition is called	condition is called
turgidity.	flaccidity.

Answer 6.

- (a) (i) 1. RBCs,
- **2.** WBC.
- 3. Platelets,
- 4. Plasma.

(ii)

RBC	WBC		
1. These are	These are Irregular		
biconcave disc	amoeboid shaped.		
shaped.	A MI IN		
2. RBCs do not have	They are		
the nucleus.	characterized by the		
	presence of a large		
	central nucleus.		

- (iii) Fibrinogen
- (iv) About 120 days
- (v) Absence of nucleus in RBCs make them biconcave shaped. This increases their surface area for absorbing more oxygen. They do not have mitochondria so they are unable to use oxygen for themselves, so all oxygen is transported and delivered to cells and tissues. Absence of endoplasmic reticulum make them flexible due to which these can easily move through narrow capillaries.
- (b) (i) Education makes people aware about the advantages of having a small family and birth control measures which in turn help in controlling the population of the country. Thus, education is very important for population control.
 - (ii) Placenta is a disc-like structure which connects foetus with mother. It delivers food, oxygen to the foetus and removes carbon dioxide, nitrogenous waste from foetus. It acts as barrier to germs and helps in secretion of Estrogen and Progesterone. Thus, placenta is an important structure for the development of foetus.
 - (iii) Green plants are the only autotrophs which prepare their own food. All other living beings depend upon green plants for their food. So, all the food chains begin with green plants.
 - (iv) If the soil is fertilized and not watered properly, then the concentration of the soil becomes high. As a result, soil becomes hypertonic as compared to the root cells of the plant, so exosmosis takes place which may result in drop of water level in plant and thus plant wilts.
 - (v) Sharp objects when put into the ears may rupture the eardrum, leading to deafness. So, we should not put sharp objects into our ears.

Answer 7

(a) (i) Absorption of water by roots, Transpiration through leaves.

- Oil was added to water to prevent loss of water through evaporation.
- (ii) The final weight of the plant will be lesser than its initial weight since the rate of transpiration is more than the rate of absorption of water hence leaves transpire, causing the reduction in the weight of the plant.
- (iii) 1. In humid conditions, transpiration rate is very low so level of water in jar will not show much change.
- **2.** On a windy day, transpiration rate increases so level of water in the jar will fall rapidly.
- (iv) 1. Sunken stomata
- **2.** Modification of leaves into spines.
- **3.** Presence of thick layer of cuticle on the leaf surface.
- **(v)** Guttation is the process of loss of water in the form of droplets from special openings called hydathodes present on the margins of leaves.

(b) (i)



 F_1 generation \rightarrow GgIi [pea plants with green inflated pods]

Phenotype: Inflated, green pods

Genotype : GgIi.

Cross pollination has occurred to produce F₁ generation.

(ii) 9:3:3:1

(iii)

$\begin{matrix} \textbf{Gametes} \\ \Rightarrow \\ \downarrow \end{matrix}$	GI	Gi	gI	gi
GI	GGII	GGIi	GgII	GgIi
Gi	GGIi	GGii	GgIi	Ggii
gI	GgII	GgIi	ggII	ggIi
gi	GgIi	Ggii	ggIi	ggii

- So, the possible combination of gametes in F_2 generation are GI, Gi, gI, gi.
- (iv) Law of segregation states that the two members of a pair of factors separate during the formation of gametes. They do not blend but segregate into different gametes.
- (v) Pisum sativum.

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BIOLOGY

2017

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- (i) The process by which root hairs absorb water from the soil.
- (ii) The organ which produces urea.
- (iii) The kind of lens required to correct Myopia.
- **(iv)** The pituitary hormone which stimulates contraction of uterus during child birth.
- (v) The international health organization which educates people in accident prevention.**
- (b) Choose the correct answer from each of the four options given below: [5]
 - (i) The prime source of chlorofluorocarbons is:
 - (A) Vehicular emissions
 - (B) Industrial effluents
 - (C) Domestic sewage
 - (D) Refrigeration equipments
 - (ii) Penicillin obtained from a fungus is:*
 - (A) Antibiotic
- (B) Antiseptic
- (C) Antibody
- (D) Antiserum
- (iii) Marine fish when placed in tap water bursts because of:
- (A) Endosmosis
- (B) Exosmosis
- (C) Diffusion
- (D) Plasmolysis
- **(iv)** Surgical method of sterilization in a woman involves cutting and tying of:
- (A) Ureter
- (B) Uterus
- (C) Urethra
- (D) Oviduct
- **(v)** Synthesis phase in the cell cycle is called so, because of the synthesis of more:
- (A) RNA
- (B) RNA and proteins
- (C) DNA
- (D) Glucose
- (c) The statements given below are incorrect. Rewrite the correct statement by changing the underlined words of the statements: [5]
 - **(i)** The Graafian follicle after ovulation turns into a hormone producing tissue called <u>Corpus callosum.</u>
- ** Answer is not given due to change in the present syllabus.

- (ii) Deafness is caused due to the rupturing of the Pinna.
- (iii) Gyri and Sulci are the folds of Cerebellum.
- **(iv)** Free movement of solutes in and out of the cell takes place across the <u>cell membrane</u>.
- (v) The solvent used to dissolve the chlorophyll pigments while testing a leaf for starch is <u>Soda lime</u>.
- (d) Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence. [5]
 Example: Large intestine, Stomach, Mouth, Small intestine, Oesophagus.

Answer: Mouth \rightarrow Oesophagus \rightarrow Stomach \rightarrow Small intestine \rightarrow Large intestine.

- (i) Fibrin, Platelets, Thromboplastin, Fibrinogen, Thrombin.
- (ii) Cochlea, Malleus, Pinna, Stapes, Incus.
- (iii) Receptor, Spinal cord, Effector, Motor neuron, Sensory neuron.
- **(iv)** Uterus, Parturition, Fertilisation, Gestation, Implantation.
- (v) Caterpillar, Snake, Owl, Frog, Green leaves.
- (e) Choose the **ODD** one out of the following terms given and name the **CATEGORY** to which the others belong:
 - (i) Aqueous humour, Vitreous humour, Iris, Central canal
 - (ii) Formalin, Iodine, DDT, Lime**
 - (iii) ACTH, TSH, ADH, FSH
 - (iv) Phosphate, RNA, Sugar, Nitrogenous base
 - (v) Bile, Urea, Uric acid, Ammonia
 - Given below are group of terms. In each group the first pair indicates the relationship between the two terms. Rewrite and complete the second pair on a similar basis.

Example: Oxygen: Inspiration: Carbon dioxide: Expiration

(i)	Eye: Optic nerve:: Ear:
(ii)	Cytoplasm: Cytokinesis:: Nucleus:
(iii)	<i>TT : Homozygous : : Tt :</i>
(iv)	Foetus: Amnion:: Heart:

g) Match the items given in <u>Column A</u> with the most appropriate ones in <u>Column B</u> and rewrite the correct matching pairs:

(v) Adenine: Thymine:: Cytosine: __

Column A	Column B
(i) Sacculus	Dynamic body bal-
	ance
(ii) Birth rate	Hyperglycemia
(iii) DNA and histones	Hypoglycemia
(iv) Euro norms	Natality
(v) Diabetes mellitus	Static body balance
	Vehicular standards
	Nucleosome

(h) The diagram given below represents the location and structure of an endocrine gland. Study the same and answer the questions that follow: [5]



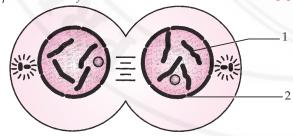
- (i) Name the endocrine gland shown in the diagram.
- (ii) Name the secretion of the gland which regulates basal metabolism.
- (iii) Name the mineral element required for the synthesis of the above mentioned hormone.
- **(iv)** Name the disease caused due to undersecretion of the above mentioned hormone in children.
- **(v)** Name the disease caused due to hypersecretion of the above mentioned hormone.

SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

(a) Study the diagram given below which represents a stage during the mitotic cell division and answer the questions that follow: [5]

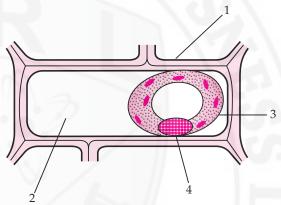


- (i) Identify the stage giving suitable reasons.
- (ii) Name the parts numbered 1 and 2.
- (iii) What is the technical term for the division of nucleus?
- **(iv)** Mention the stage the comes before the stage shown in the diagram. Draw a neat labelled diagram of the stage mentioned.
- ** Answer is not given due to change in the present syllabus.

- **(v)** Which is the cell division that results in half the number of chromosomes in daughter cells?
- (b) Differentiate between the following pairs on the basis of what is mentioned in brackets: [5]
 - **(i)** Active Transport and Diffusion (significance in plants)
 - (ii) Demography and Population density (Definition)
 - (iii) Antibiotic and Antibody (Source)**
 - **(iv)** Renal cortex and Renal medulla (Parts of the nephrons present)
 - (v) NADP and ATP (Expand the abbreviation)

Question 3.

(a) The diagram given represents a plant cell after being placed in a strong sugar solution. Study the diagram and answer the questions that follow: [5]



- (i) What is the state of the cell shown in the diagram?
- (ii) Name the structure that acts as a selectively permeable membrane.
- (iii) Label the parts numbered 1 to 4 in the diagram.
- (iv) How can the above cell be brought back to its original condition? Mention the scientific term for the recovery of the cell.
- **(v)** State any two features of the above plant cell which is not present in animal cells.
- (b) Given below is a representation of kind of pollution. Study the same and answer the questions that follow: [5]



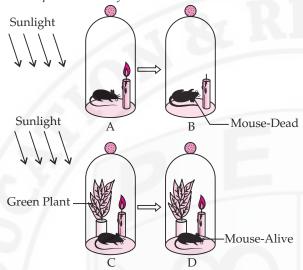
- (i) Name the kind of pollution.
- (ii) List any three common sources of this pollution.
- **(iii)** *Mention three harmful effects of this pollution on human health.*

- (iv) Explain the term 'Pollutant'.
- (v) Name two soil pollutants.

Question 4.

(a) The diagrams given below represent the relationship between a mouse and a physiological process that occurs in green plants. Study the diagram and answer the questions that follow:

[5]

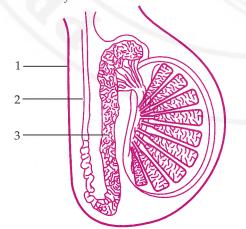


- (i) Name the physiological process occurring in the green plant that has kept the mouse alive.
- (ii) Explain the physiological process mentioned above.
- (iii) Why did the mouse die in bell jar B?
- (iv) What is the significance of the process as stated in
- (i) for life on earth?
- (v) Represent the above mentioned physiological process in the form of a chemical equation.
- **(b)** *Mention the exact location of the following*: [5]
 - (i) Prostate gland
- (ii) Myelin sheath
- (iii) Islets of Langerhans (iv) Semi-circular canals
- (v) Eustachian tube.

Ouestion 5.

(a) The diagram shown below is the longitudinal section of a testis of man. Study it carefully and answer the questions that follow:

[5]

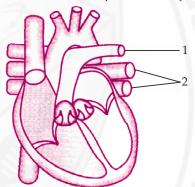


** Answer is not given due to change in the present syllabus.

- (i) Label the parts numbered 1 to 3 in the diagram.
- (ii) In which part of the testis are the sperms produced?
- (iii) State the functions of the parts labelled 1 and 3 in the diagram.
- (iv) Name the cells that secrete Testosterone.
- (v) Draw a neat, labelled diagram of a sperm.
- **(b)** *Give biological reasons for the following statements* : [5]
 - (i) Some women have facial hair like beard and moustache.
 - (ii) Cutting of trees should be discouraged.
 - (iii) In some xerophytes leaves are modified into spines.
 - (iv) There is frequent urination in winter than in summer.
 - (v) The left ventricle of the heart has a thicker wall than the right ventricle.

Question 6.

(a) The diagram given below represents a section of the human heart. Answer the questions that follow: [5]



- (i) Which parts of heart are in the diastolic phase? Give a reason to support your answer.
- **(ii)** Label the parts numbered 1 and 2 in the diagram. What type of blood flows through them?
- (iii) What causes the heart sounds 'LUBB' and 'DUP'?
- (iv) Name the blood vessels that supply oxygenated blood to the heart muscles.
- **(v)** Draw neat labelled diagrams of a cross section of an artery and a vein.
- (b) Give appropriate biological/technical terms for the following: [5]
 - (i) The type of immunity that exists in our body due to our genetic makeup.**
 - (ii) The suppressed allele of a gene.
 - (iii) The accessory gland in human males whose secretion activates the sperms.
 - **(iv)** An apparatus that measures the rate of water uptake in a cut shoot due to transpiration.
 - (v) The kind of twins formed from two fertilised eggs.
 - **(vi)** A pair of corresponding chromosomes of the same size and shape, one from each parent.

(vii) The mild chemical substance which when applied on the body kills germs.**

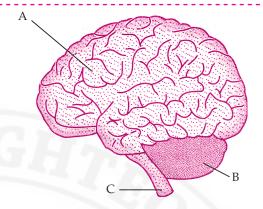
(viii) The type of waste generated in hospitals and pathological laboratories.

(ix) The antiseptic substance in tears.

(x) Cellular components of blood containing haemoglobin.

Question 7.

- (a) In a homozygous pea plant, axial flowers (A) are dominant over terminal flowers (a). [5]
 - (i) What is the phenotype and genotype of the F_1 generation if a plant bearing pure axial flowers is crossed with a plant bearing pure terminal flowers?
 - (ii) Draw a Punnett square board to show the gametes and offsprings when both the parent plants are heterozygous for axial flowers.
 - (iii) What is the phenotypic ratio and genotypic ratio of the above cross shown in (ii)?
 - (iv) State Mendel's Law of Dominance.
 - (v) Name two genetic disorders commonly seen in human males.
- (b) The diagram given below is an external view of the human brain. Study the same and answer the questions that follow: [5]



- (i) Name the parts labelled A, B and C in the diagram.
- (ii) State the main functions of the parts labelled A and B.
- (iii) What are the structural and functional units of the brain? How are the parts of these units arranged in A and B?
- **(iv)** Mention the collective term for the membranes covering the brain.
- (v) What is the function of Cerebrospinal fluid?

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Osmosis [Endosmosis] (ii) Liver
 - (iii) Concave lens
- (iv) Oxytocin
- **(b) (i) (D)** Refrigeration equipments
 - (ii) (A) Antibiotic
- (iii) (A) Endosmosis
- (iv) (D) Oviduct
- (v) (C) DNA
- (c) (i) The Graafian follicle after ovulation turns into a hormone producing tissue called **Corpus** luteum
 - (ii) Deafness is caused due to the rupturing of the ear drum/tympanum.
 - (iii) Gyri and Sulci are the folds of Cerebrum.
 - (iv) Free movement of solutes in and out of the cell takes place across the **cell wall**.
 - (v) The solvent used to dissolve the chlorophyll pigments while testing a leaf for starch is **methylated spirit**.
- (d) (i) Platelets \rightarrow Thromboplastin \rightarrow Thrombin

 \rightarrow Fibrinogen \rightarrow Fibrin (f)

(ii) Pinna \rightarrow Malleus \rightarrow Incus \rightarrow Stapes \rightarrow Cochlea

(iii) Receptor →Sensory neuron → Spinal cord→ Motor neuron → Effector

** Answer is not given due to change in the present syllabus.

(iv) Fertilisation \rightarrow Uterus \rightarrow Implantation \rightarrow

Gestation \rightarrow Parturition

(v) Green leaves \rightarrow Caterpillar \rightarrow Frog \rightarrow

Snake \rightarrow Owl

(e) (i) Odd one : Central canal

Category: Rest are found in our eye whereas central canal is seen in spinal cord.

(iii) Odd one: ADH

Category: Rest are hormones secreted from anterior pituitary whereas ADH is secreted from posterior pituitary.

(iv) Odd one: RNA

Category: Rest are components of a nucleotide whereas RNA is a nucleic acid.

(v) Odd one: Bile

Category: Rest are nitrogenous metabolic waste whereas bile is produced in liver and stored in gall bladder and play an important role in digestion *i.e.*, emulsification of fats.

- (i) Eye : Optic nerve : : Ear : <u>Auditory nerve</u>.
 - (ii) Cytoplasm : Cytokinesis : : Nucleus : Karyokinesis.
 - (iii) TT : Homozygous : : Tt : <u>Heterozygous.</u>
 - (iv) Foetus: Amnion:: Heart: Pericardium.
 - (v) Adenine: Thymine:: Cytosine: Guanine.

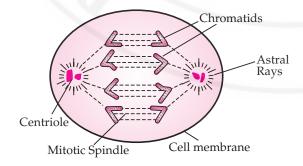
(g)		Column A		Column B
	(i)	Sacculus	_	Static body
				balance
	(ii)	Birth rate	_	Natality
	(iii)	DNA and histones	_	Nucleosome
	(iv)	Euronorms	_	Vehicular
				standards
	(v)	Diabetes mellitus	—	Hyperglycemia

- (h) (i) The endocrine gland shown in the diagram is thyroid gland.
 - (ii) The secretion of this gland is thyroxine which regulates basal metabolism.
 - (iii) The mineral element required for synthesis of thyroxine is iodine.
 - (iv) Cretinism is caused due to undersecretion of thyroxine in children.
 - **(v)** Exophthalmic goitre is caused due to hypersecretion of thyroxine.

SECTION-II

Answer 2.

- (a) (i) The stage shown in the figure is telophase due to the following reasons:
 - **1.** Nuclear membrane and nucleolus have reappeared.
 - **2.** Spindle fibres are disappearing.
 - **3.** Furrows have been formed for the division of cytoplasm.
 - **4.** Sister chromatids reach opposite poles.
 - **5.** The two sets of daughter chromosomes have reached the opposite poles.
 - (ii) 1. Chromatin fibres
 - 2. Nuclear membrane
 - (iii) The division of nucleus is called Karyokinesis.
 - **(iv)** The stage comes before this stage that is shown in the diagram is anaphase.



(v) Meiosis is the cell division that results in half the number of chromosomes in daughter cells. (b) (i)

Active Transport	Diffusion
nutrients like nitrates, sulphates, potassium	Gaseous exchange during respiration and photosynthesis in plants occurs by diffusion process.

(ii)

Demography	Population Density
Statistical study of	Population density
human population	is the number of
specially with refer-	individuals per
ence to size and den-	square kilometre at
sity, distribution and	any given time.
other vital statistics is	1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
called demography.	

(iv)

Renal Cortex	Renal Medulla
proximal convoluted	Loop of Henle which is the U-shaped part of nephron lies in
	renal medulla along with the collecting duct.

(v)

NADP			A	ATP	
					Adenosine
amide A	den	ine Dinu-	Triph	ospl	hate.
cleotide Phosphate.		_			

Answer 3.

- (a) (i) The cell shown in the diagram is in flaccid [plasmolysed] state.
 - (ii) Plasma membrane acts as a selectively permeable membrane.
 - (iii) 1. Cell wall
 - 2. Strong sugar solution
 - 3. Cell membrane
 - 4. Nucleus
 - (iv) If this flaccid or plasmolysed cell is placed in water, its protoplasm again swells up and cell can retain back its original condition. This recovery of the cell is called deplasmolysis.
 - (v) In plant cell, cell wall, a large vacuole in the centre and chloroplasts are present which is not seen in an animal cell.
- **(b) (i)** The diagram shown represents noise pollution.
 - (ii) The three common sources of noise pollution are:
 - 1. Industrial machines and workshops

- 2. Loudspeakers and musical bands
- 3. Trains and automobiles on street
- (iii) The three harmful effects of noise pollution on human health are :
- **1.** Interrupts concentration of thought and disturbs peace of mind.
- **2.** Disturbs sleep and leads to nervous irritability.
- **3.** A sudden loud sound can damage eardrum and prolonged noise leads to deafness.
- **(iv)** Pollutant is any such constituent which causes pollution.

OR

A pollutant is a substance or energy introduced into the environment that has undesired effects, or adversely affects the usefulness of a resource.

- (v) The two soil pollutants are:
- **1.** Industrial waste like chemical residues, metallic ash, fly ash etc.
- 2. Chemical fertilizers and pesticides like DDT.

Answer 4.

- (a) (i) Photosynthesis is the physiological process that is occurring in the green plant. It releases oxygen which kept the mouse alive.
 - (ii) Photosynthesis is the process by which living plant cells containing chlorophyll produce food substances like glucose and starch from carbon dioxide and water by using light energy. Plants release oxygen gas during this process which is a life supporter for the living organisms on the earth's surface.
 - (iii) In bell jar B, there is no green plant so no oxygen is produced by photosynthesis process. The oxygen gas that is present in the bell jar has already been consumed by the mouse and the burning candle. So due to lack of oxygen, the mouse died and also the candle got extinguished. (iv) The significance of photosynthesis process is
 - that it is the only biological process which releases oxygen into the atmosphere that supports all life forms on the earth's surface. Green plants synthesise their food by photosynthesis. All organisms are directly or indirectly dependent on green plants for their food.

(v)
$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Light energy}} \text{Chlorophyll}$$

$$C_6H_{12}O_6 + 6H_2O + 6O_2$$

- **(b) (i) Prostate gland :** It surrounds the urethra close to its origin from the urinary bladder.
 - **(ii) Myelin sheath**: It is an insulating envelope that surrounds the axon of nerve cells.
 - (iii) Islets of Langerhans: It is a special group of hormone secreting cells found in the pancreas.

- **(iv) Semi-circular canals:** They are a set of three canals found in inner ear which are arranged at right angles to each other in three different planes so that one is horizontal and other two are vertical.
- **(v) Eustachian tube :** It connects the cavity of the middle ear with the throat.

Answer 5.

- (a) (i) 1– Scrotum
 - 2- Vas deferens/ Sperm duct / Vasa deferentia
 - 3- Epididymis
 - (ii) The sperms are produced in seminiferous tubules.
 - (iii) The function of scrotum or scrotal sacs is that it contains the testis and its temperature is 2°C or 3°C lower than body temperature that favours production of sperms.

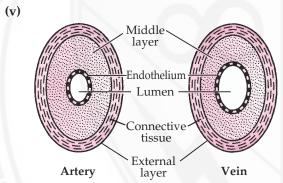
The function of epididymis is that it stores the sperms for some days during which they mature and become motile.

- **(iv)** The interstitial cells or Leydig cells produce male hormone testosterone.
- (v) Refer to ICSE Paper, 2018, Answer 3(a) (v).
- (b) (i) When women have high level of androgens in their blood or if there is an overgrowth of adrenal cortex in a mature woman, she develops certain male characteristics such as a beard, moustaches and deep male voice. This condition is known as adrenal virilism.
 - (ii) Cutting of trees should be discouraged because if there were no green plants, all life on the earth would come to an end. Trees provides food and oxygen to all by the process of photosynthesis. Oxygen is the life supporting gas. They release water in the form of vapours by transpiration process which helps in bringing rain, so they also affect our climate. They also absorb carbon dioxide from the atmosphere for the process of photosynthesis. This helps in controlling global warming.
 - (iii) In some xerophytes, leaves are modified into spines to reduce transpiration process as xerophytes are mainly found in deserts where there is water scarcity. As leaves are modified into spines, their surface area is reduced hence transpiration will be less.
 - (iv) During winter, surrounding temperature is low and there is almost no sweating. So water is not lost by perspiration. Hence, water along with waste substances is mainly removed through urine. So, we urinate frequently in winter than in summer.
 - (v) The left ventricle pumps blood to the farthest points of the body like toes, feet, brain and other parts of the body whereas right

ventricle pumps blood only up to the lungs. So walls of left ventricle are thicker than walls of right ventricle.

Answer 6.

- (a) (i) Ventricles are in the diastolic phase as semilunar valves at root of aorta and pulmonary artery are closed and bicuspid and tricuspid valves are open. Blood enters from atria to ventricles through atrio-ventricular valves.
 - (ii) 1–Pulmonary artery 2–Pulmonary vein Deoxygenated blood flows through pulmonary artery and oxygenated blood flows through pulmonary veins.
 - (iii) LUBB sound is caused by the closure of atrioventricular valves *i.e.*, tricuspid and bicuspid valves. Due to closure of semilunar valves located at the root of pulmonary artery and aorta, DUP sound is produced.
 - **(iv)** Coronary artery supplies oxygenated blood to the heart muscles.

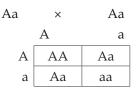


Artery

- (b) (ii) Recessive allele
 - (iii) Seminal vesicles
 - (iv) Ganong's potometer
 - (v) Fraternal twins
 - (vi) Homologous chromosomes
 - (viii) Biomedical waste
 - (ix) Lysozyme
 - (x) RBCs/Erythrocytes

Answer 7.

(a) (i) The phenotype of the F₁ generation is plants with axial flowers will be produced. The genotype of F₁ generation plants is Aa, i.e., all plants are heterozygous dominant for axial flowers. (ii)



- (iii) From the above cross, 3 plants with axial flowers (AA, Aa, Aa) and 1 plant with terminal flower (aa) is produced. So, phenotypic ratio is
- 3:1. Genotypic ratio is 1:2:1 *i.e.*, 1AA: 2Aa: 1aa
- (iv) Mendel's Law of Dominance states that "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 itself is the dominant character and the one unexpressed is the recessive. The recessive character can express only when the pair is homozygous recessive."
- **(v)** Haemophilia and colour blindness are two common genetic disorders commonly seen in human males.
- (b) (i) A Cerebrum
 - B Cerebellum
 - C Spinal cord
 - (ii) Cerebrum is the seat of intelligence, consciousness and will power. It controls all voluntary activities. Cerebellum coordinates muscular activities and maintains balance of the body.
 - (iii) Neuron is the structural and functional unit of the brain. In cerebrum, outer portion contains cell bodies of the neuron whereas inner portion contains axons of the neurons. Whereas in spinal cord, outer portion contains axons and inner portion contains cell bodies of neurons.
 - (iv) The membranes covering the brain are meninges which are a three membranous covering.
 - (v) Cerebrospinal fluid is a watery fluid found within the space of the covering membrane and also in ventricles of brain and central canal of spinal cord. It acts like a cushion to protect the brain from mechanical shocks. It also acts as a medium for the exchange of food materials, waste products and respiratory gases with neurons.

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BIOLOGY

2016

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- (i) The exchange of chromatid parts between the maternal and the paternal chromatids of a pair of homologous chromosomes during meiosis.
- (ii) The number of individuals inhabiting per unit area.
- (iii) The immunity acquired by providing ready-made antibodies from outside for treating certain infectious diseases.**
- **(iv)** The pollutants that cannot be broken down to simple and harmless products.
- (v) The part of the brain that carries impulses from one hemisphere of the cerebellum to the other.
- (b) Choose the correct answer from each of the four options given below: [5]
 - (i) A plant cell may burst when:
 - (A) Turgor pressure equalises wall pressure
 - (B) Turgor pressure exceeds wall pressure
 - (C) Wall pressure exceeds turgor pressure
 - (D) None of the above
 - **(ii)** *The individual flattened stacks of membranous structures inside the chloroplasts are known as :*
 - (A) Grana
- (B) Stroma
- (C) Thylakoids
- (D) Cristae
- (iii) The nephrons discharge their urine at the:
- (A) Urinary bladder
- (B) Urethra
- (C) Renal pelvis
- (D) Renal pyramid
- (iv) Gigantism and Acromegaly are due to:
- (A) Hyposecretion of Thyroxine
- (B) Hyposecretion of Growth hormone
- (C) Hypersecretion of Thyroxine
- (D) Hypersecretion of Growth hormone
- **(v)** *The mineral ion needed for the formation of blood clot is :*
- (A) Potassium
- (B) Sodium
- (C) Calcium
- (D) Iron
- (c) In each set of terms given below, there is an odd one and cannot be grouped in the same category to which the other three belong. Identify the odd term in each set and name the category to which the remaining three belong.

 [5]
- ** Answer is not given due to change in the present syllabus.

Example: Ovary, Fallopian tube, Ureter, Uterus.

Odd term: Ureter

Category: Parts of female reproductive system.

- (i) Sewage, Newspaper, Styrofoam, Hay.
- (ii) Thymine, Cytosine, Adenine, Pepsin.
- (iii) Malleus, Iris, Stapes, Incus.
- **(iv)** Cortisone, Somatotropin, Adrenocorticotropic hormone, Vasopressin.
- (v) Typhoid, Haemophilia, Albinism, Colour blindness.
- (d) Complete the following paragraph by filling in the blanks (i) to (v) with appropriate words:

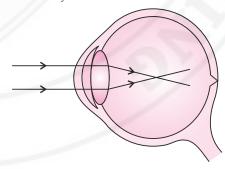
 [5]

 The amount of wine output is under the regulation of

The amount of urine output is under the regulation of a hormone called

- (i) ______ secreted by the (ii) ______ lobe of the pituitary gland. If this hormone secretion is reduced, there is an increased production of urine. This disorder is called (iii) ______ . Sometimes excess glucose is passed with urine due to hyposecretion of another hormone called (iv) _____ leading to the cause of a disease called (v) _____ .
- (e) State the exact location of the following structures: [5]
 - (i) Centromere
- (ii) Chordae tendinae
- (iii) Thyroid gland
- (iv) Ciliary body
- (v) Proximal convoluted tubule
- (f) Given below is a diagram depicting a defect of the human eye. Study the same and then answer the questions that follow:

 [5]



- (i) Name the defect shown in the diagram.
- **(ii)** What are the two possible reasons that cause this defect?
- (iii) Name the type of lens used to correct this defect.
- **(iv)** With the help of a diagram show how the defect shown above is rectified using a suitable lens.

(g) Given in the box below are a set of 14 biological terms. Of these, 12 can be paired into 6 matching pairs. Out of the six pairs, one has been done for you as an example.

Example: Endosmosis — Turgid cell.

Cushing's syndrome, Turgid cell, Iris, Free of rod and cone cells, Colour of eyes, Hypoglycemia, Active transport, Acrosome, Addison's disease, Blind spot, Hyperglycemia, Spermatozoa, Endosmosis, Clotting of blood.

- **(h)** State the main function of the following:
 - (i) Lymphocytes of blood (ii)
 - (ii) Leydig cells
 - (iii) Guard cells
- (iv) Eustachian tube
- (v) Corpus luteum

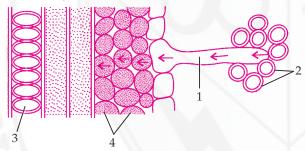
SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

(a) The figure given below is a diagrammatic representation of a part of the cross section of the root in the root hair zone. Study the same and then answer the questions that follow:

[5]

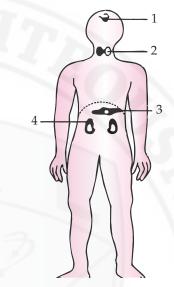


- (i) Name the parts indicated by the guidelines 1 to 4.
- (ii) Which is the process that enables the passage of water from the soil into the root hair?
- (iii) Name the pressure that is responsible for the movement of water in the direction indicated by the arrows. Define it.
- **(iv)** Due to an excess of this pressure sometimes drops of water are found along the leaf margins of some plants especially in the early mornings. What is the phenomenon called?
- **(v)** Draw a well labelled diagram of the root hair cell as it would appear if an excess of fertilizer is added to the soil close to it.
- (b) Differentiate between the following pairs on the basis of what is mentioned within brackets: [5]
 - (i) Human skin cell and human ovum (number of chromosomes)
 - (ii) Sperm duct and fallopian tube (function).
 - (iii) Red Cross and WHO (one activity).**
- ** Answer is not given due to change in the present syllabus.

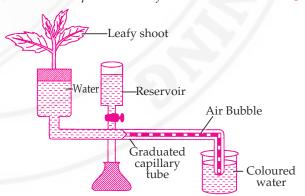
- (iv) Rod cells and cone cells (pigment).
- **(v)** LUBB and DUPP (names of the valves whose closure produce the sound).

Question 3.

(a) Given below is the outline of the human body showing the important glands: [5]



- (i) Name the glands marked 1 to 4.
- (ii) Name the hormone secreted by part 2. Give one important function of this hormone.
- (iii) Name the endocrine part of the part numbered 3.
- **(iv)** Why is the part labelled 1 called the master gland? Which part of the forebrain controls the gland labelled 1?
- (v) Name the gland that secretes the 'emergency hormone'.
- (b) The diagram of an apparatus given below demonstrates a particular process in plants. Study the same and answer the questions that follow: [5]



- (i) Name the apparatus.
- **(ii)** Which phenomenon is demonstrated by this apparatus?
- (iii) Explain the phenomenon mentioned in (ii) above.
- **(iv)** State two limitations of using this apparatus.

- **(v)** What is the importance of the air bubble in the experiment?
- (vi) Name the structure in a plant through which the above process takes place.

Question 4.

- (a) (i) Draw a well labelled diagram of the membranous labyrinth found in the inner ear. [5]
 - (ii) Based on the diagram drawn above in (i) give a suitable term for each of the following descriptions:
 - (1) The sensory cells that helps in hearing.
 - **(2)** The part that is responsible for static balance of the body.
 - (3) The membrane covered opening that connects the middle ear to the inner ear.
 - **(4)** The fluid present in the middle chamber of cochlea.
 - **(5)** *The structure that maintains dynamic equili-brium of the body.*
- **(b)** *Give the Biological/technical term for the following* : [5]
 - (i) Complete stoppage of menstrual cycle in females.
 - (ii) Pigment providing colour to urine.
 - (iii) The vein which drains the blood from the intestine to the liver.
 - (iv) The canal through which has testes descend into the scrotum just before the birth of a male baby.
 - (v) The process causing an undesirable change in the environment.
 - (vi) The removal of nitrogenous wastes from the body.
 - (vii) The repeating components of each DNA strand lengthwise.
 - (viii) An alteration in the genetic material that can be inherited.
 - **(ix)** The process of uptake of mineral ions against the concentration gradient using energy from the cell.
 - (x) Blood vessels carrying blood to the left atrium.

Question 5.

- (a) The given diagram shows a stage during mitotic division in an animal cell: [5]
 - (i) Identify the stage. Give a reason to support your answer.

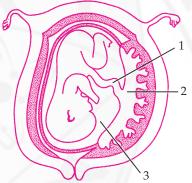


- (ii) Draw a neat labelled diagram of the cell as it would appear in the next stage. Name the stage.
- (iii) In what two ways is mitotic division in an animal cell different from the mitotic division in a plant cell?

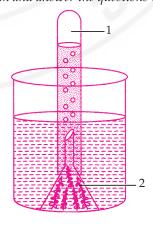
- (iv) Name the type of cell division that occurs during:
- (A) Growth of a shoot.
- (B) Formation of pollen grains.
- **(b)** *Give scientific reasons for the following statements* : **[5]**
 - (i) Colour blindness is more common in men than in women.
 - (ii) Injury to medulla oblongata leads to death.
 - (iii) When an ovum gets fertilized, menstrual cycle stops temporarily in a woman.
 - **(iv)** Mature erythrocytes in humans lack nucleus and mitochondria.
 - **(v)** Blood flows in arteries in spurts and is under pressure.

Question 6.

(a) The diagram given below is that of a developing human foetus. Study the diagram and then answer the questions that follow: [5]



- (i) Label the parts numberred 1 to 3 in the diagram.
- (ii) Mention any two functions of the part labelled 2 in the diagram.
- (iii) Explain the significance of the part numbered 3 in the diagram.
- **(iv)** Define the term 'Gestation'. What is the normal gestational period of the developing human embryo?
- **(v)** Mention the sex chromosomes in a male and female embryo.
- (b) The following diagram demonstrates a physiological process taking place in green plants. The whole set up was placed in bright sunlight for several hours. Study the diagram and answer the questions that follow:[5]



- **(i)** What aspect of the physiological process is being examined?
- (ii) Explain the physiological process mentioned in (i) above.
- (iii) Label the parts numbered 1 and 2 in the diagram.
- **(iv)** Write a well-balanced chemical equation for the physiological process explained in **(ii)** above.
- **(v)** What would happen to the rate of bubbling of the gas if a pinch of sodium bicarbonate is added to the water in the beaker? Explain your answer.

Question 7.

- (a) A homozygous tall plant (T) bearing red coloured (R) flowers is crossed with a homozygous dwarf (t) plant bearing white (r) flowers:
 - (i) Give the genotype and phenotype of the plants of F_1 generation.

- (ii) Mention the possible combinations of the gametes that can be obtained from the F_1 hybrid plant.
- (iii) State the Mendel's law of Independent Assortment.
- (iv) Mention the phenotypes of the offsprings obtained in F_2 generation.
- (v) What is the phenotypic ratio obtained in F_2 generation?

[5]

- (b) Briefly explain the following terms:
 - (i) Reflex action
 - (ii) Power of accommodation
 - (iii) Photophosphorylation
 - (iv) Hormone
 - (v) Synapse

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Crossing over
 - (ii) Population density
 - (iv) Non-biodegradable pollutants
 - (v) Pons varolii
- (b) (i) (B) Turgor pressure exceeds wall pressure
 - (ii) (C) Thylakoids
 - (iii) (C) Renal pelvis
 - (iv) (D) Hypersecretion of growth hormone
 - (v) (C) Calcium
- (c) (i) Odd term : Styrofoam

Category: Biodegradable materials

(ii) Odd term: Pepsin

Category: Nitrogenous bases of DNA

(iii) Odd term: Iris

Category: Ear ossicles

(iv) Odd term: Cortisone

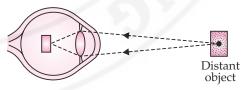
Category: Hormones secreted by pituitary gland

(v) Odd term: Typhoid

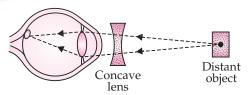
Category: Genetic disorders

- (d) (i) Antidiuretic hormone (ADH) or Vasopressin
 - (ii) Posterior
- (iii) Diabetes insipidus
- (iv) Insulin
- (v) Diabetes mellitus
- **(e) (i) Centromere :** A part of chromosome is marked by a primary constriction which divides the chromosome into two arms. In this region of primary constriction, lies the centromere, which joins the two sister chromatids.

- (ii) Chordae tendinae: Between bicuspid/ tricuspid valves and papillary muscles of the heart.
- (iii) Thyroid gland: Thyroid gland is present below larynx over the upper part of the trachea in the neck region.
- **(iv) Ciliary body**: At the junction of choroid and iris.
- **(v) Proximal convoluted tubule :** At the cortex of the kidney, just below the Bowman's capsule.
- **(f) (i)** The defect shown in the diagram is called Short-sightedness or Myopia.
 - (ii) This defect may arise due to:
 - **1.** Excessive curvature of the eye lens.
 - **2.** Elongation of the eyeball.
 - (iii) The defect can be corrected by using spectacles with concave or divergent lenses.
 - (iv) Diagram showing rectification of the defect:



Myopia



Myopia with correction

(g)

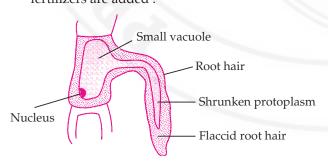
1.	Cushing's syndrome	Hyperglycemia	
2.	Iris	Colour of the eyes	
3.	Free of rod and cone cells	Blind spot	
4.	Hypoglycemia	Addison's disease	
5.	Acrosome	Spermatozoa	

- (h) (i) Lymphocytes of blood: These are the defense cells of our body. These produce antibodies for immobilising the foreign particles and their toxins. They are thus, the immunity arsenals of our body.
 - (ii) Leydig cells: Also called 'Interstitial cells'. Secrete male sex hormone testosterone.
 - (iii) Guard cells: Regulates the opening and closing of stomata in leaf to facilitate transpiration and exchange of gases.
 - (iv) Eustachian tube: Balances air pressure on either sides of eardrum, so that eardrum can vibrate freely.
 - **(v) Corpus luteum :** Secretes hormones oesterogen, progesterone and relaxin.

SECTION-II

Answer 2.

- (a) (i) 1. Root hair cell (Epiblema cell)
 - 2. Soil particles
 - 3. Xylem vessel
 - 4. Cortex cells
 - (ii) The process that enables the passage of water from the soil into the root hair is osmosis.
 - (iii) The pressure is root pressure. Root pressure is a positive pressure found in the xylem channel of some plants due to inflow of water.
 - (iv) This phenomenon is called guttation.
 - **(v)** Diagram of root hair cell when excessive fertilizers are added:



The excessive fertilizers when added to soil create hypertonic conditions near the root hair and leads to the movement of water from the root hair cell to the outside environment. This causes the root hair to shrink.

(b) (i)

Human skin cell	Human ovum	
Human skin cell is	Human ovum is	
a somatic cell with	female gamete bearing	
diploid number of	haploid number of	
chromosomes, i.e., 46.	chromosomes, i.e., 23.	

(ii)

Sperm duct	Fallopian tube		
Sperm duct, also	Also known as		
known as vas deferens,	oviduct, it receives		
receives the sperms	the secondary oocyte		
from the epididymis	from the ovary and		
and transports them	also act as the site of		
along with secretions	fertilisation of egg		
of seminal vesicles,	and sperm.		
prostate gland and			
cowper's gland to the			
tip of the urethra.			

(iv)

Rod cells	Cone cells
Photoreceptor cells with a visual purple pigment called 'Rhodopsin' that aids in twilight vision (dim	In cone cells, the photosensitive pigment is visual violet or 'Iodopsin' which facilitates
light or night vision).	vision in day light or bright artificial light.

(v)

LUBB	DUPP	
It is the first heart	It is the second heart	
sound produced by	sound produced	
the closure of the	by the closure of	
bicuspid and tricuspid	pulmonary and aortic	
atrioventricular valves.	semilunar valves.	

Answer 3.

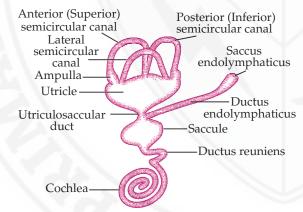
- (a) (i) 1. Pituitary gland
- 2. Thyroid gland
- 3. Pancreas
- 4. Adrenal gland
- (ii) The hormone secreted by part 2 is Thyroxine. Thyroxine controls the Basal Metabolic Rate (BMR) of the body and maintains temperature by regulating production of energy.
- (iii) The endocrine part of the gland numbered 3 is called Islet of Langerhans.
- **(iv)** The part labelled 1 is the pituitary gland and it is called the 'Master gland' because it secretes hormones which controls the secretions of other endocrine glands of our body.

The hypothalamus part of the forebrain controls (b) (i) Menopause the pituitary gland and is thus called the 'Master of master gland'.

- (v) Adrenal gland secretes the emergency hormone i.e., adrenaline.
- (b) (i) The apparatus Ganong's called Potometer.
 - (ii) The potometer demonstrates the phenomenon of transpiration.
 - (iii) The loss of water in the form of water vapour from the aerial parts of the plants is called 'Transpiration'.
 - (iv) Limitations of using this apparatus:
 - Potometer cannot measure rate transpiration precisely as not all of the water taken up by plant is used for transpiration.
 - Potometer only measures the rate of uptake of water.
 - Introducing an air bubble is difficult.
 - Twig may not be active for a long time.
 - * Any two of the above can be used.
 - (v) The movement of air bubble along the scale gives a measure of water absorbed by the plant over a period of time and hence indicates the rate of transpiration.
 - (vi) Stomata

Answer 4.

(a) (i) Diagram showing membranous labyrinth found in the inner ear:



- Sensory cells that help in hearing are called organ of corti.
 - The utricle and saccule part of the inner ear have presence of gravity receptors that aid in maintaining static balance of the body.
 - Oval window or fenestra ovalis is the membrane covered opening that connects the middle ear to the inner ear.
 - **Endolymph** is the fluid present in the middle chamber of cochlea.
 - Ampulla region of semi circular canal maintains dynamic balance of the body.

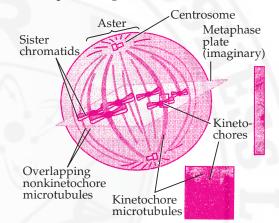
- (ii) Urochrome
- (iii) Hepatic portal vein (iv) Inguinal canal
- (v) Pollution
- (vi) Excretion
- (vii) Nucleotides
- (viii) Mutation
- (ix) Active transport
- (x) Pulmonary veins

Answer 5.

(i) The diagram represents the Prophase stage (Late prophase stage).

The stage is Late prophase as there is no nucleolus and cell organelles like Golgi body, endoplasmic reticulum have become inconspicuous, nuclear envelope is shown disintegrated into small vesicles and the two asters have reached the two poles.

(ii) Metaphase stage



Any two differences from those given below.

(111)	(iii) Any two differences from those given below					
	Animal cell mitosis	Plant cell mitosis				
1.	It occurs in almost all type of somatic cells of the organism.	It occurs in the growing tips or meristems.				
2.	An animal cell becomes rounded before cell division.	There is no change in the shape of plant cell before division.				
3.	Presence of centrosome is essential.	Centrosome is not present.				
4.	Asters are present.	Asters are absent.				
5.	Cytokinesis occurs by cleavage wherein a furrow is formed dividing the mother cell into two daughter cells.	Cytokinesis occurs commonly by the cell plate method wherein a solid middle lamella develops dividing the mother cell into two daughter cells.				

- (iv) (A) Mitosis
- (B) Meiosis
- (b) (i) Colour blindness is more common in men than in women because it is an X-linked recessive disorder. Men have just one X-chromosome and if that single X-chromosome has the allele for colour blindness, it get expressed while in women there are 2 copies of X-chromosome in which defective allele of X-chromosome get masked by the effects of other X-chromosome.
 - (ii) Medulla oblongata forms the innermost part of the brain. It controls various involuntary movements of the body like rate of heart beat, respiration, etc. Thus, any injury to medulla oblongata will hamper these involuntary activities and thus might result in death due to stoppage of heart beat and breathing.
 - (iii) In case of fertilisation of an ovum by a sperm, the corpus luteum persists and continues to secrete progesterone. Progesterone maintains endometrial lining and prevents maturation of another ovum, thus temporarily stopping the menstrual cycle.
 - (iv) Mature erythrocytes in humans lack a nucleus, so as to provide more surface area for transport of oxygen to haemoglobin in blood. They also lack mitochondria which prevents the use of oxygen for themselves in cellular respiration, thus transporting all oxygen absorbed.
 - **(v)** As the ventricles of the heart contract, they push blood into the small lunen of the arteries with a great force, thus making the blood in arteries flow in spurts and under pressure.

Answer 6.

- (a) (i) 1. Umbilical cord
 - 2. Placenta
 - 3. Amniotic fluid filled in amniotic cavity
 - (ii) Functions of the part labelled 2, *i.e.*, placenta, are as follows:
 - 1. Placenta aids in all vital metabolic functions of the foetus. It is the means of supplying nutrients to the foetus from the mother. It also helps in exchange of respiratory gases and excretion of nitrogenous wastes from the body of foetus.
 - **2.** Placenta also acts as an important endocrine gland that secretes a number of hormones.
 - **3.** Placenta acts as a barrier preventing the entry of pathogens and toxins in the body of foetus.
 - **4.** Placenta is permeable to antibodies from mother which enter the foetal blood and provide protection against diseases.
 - **5.** Placenta stores fat and glycogen which can be broken down and absorbed by the foetal part of placenta.

Any two of the above functions can be considered

- (iii) The part numbered 3 is the amniotic fluid filled amniotic cavity. The embryo is inside the amniotic cavity and is surrounded by amniotic fluid. Amniotic fluid acts as shock absorber and protects the embryo from any injury and also prevents its desiccation.
- **(iv)** Gestation, also referred as pregnancy, is the time period from conception to the birth of a baby. The normal gestation period for the developing human embryo is approximately 9 months + 10 days, *i.e.*, 280 days.
- (v) A male embryo will have the sex chromosomal complement as XY, whereas a female embryo will have XX.
- **(b) (i)** The apparatus is set to examine the release of oxygen gas during photosynthesis.
 - (ii) Photosynthesis is the process by which green plants utilize CO_2 and H_2O as raw materials in the presence of sunlight and chlorophyll, to synthesize food in the form of glucose. This process releases oxygen as a by-product.
 - (iii) 1. Oxygen getting filled in the empty space in test tube.
 - 2. Hydrilla plant
 - **(iv)** A well-balanced chemical equation for photosynthesis is as follows:

$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Sunlight energy}} \text{Chlorophyll}$$

 $C_6H_{12}O_6 + 6O_2 + 6H_2O$

(v) The rate of bubbling of the gas will increase. If a pinch of NaHCO₃ (sodium bicarbonate) is added to the water, the reaction results in the release of CO₂. This CO₂ is then utilized for photosynthesis. The increased amount of CO₂ will increase the rate of photosynthesis, which subsequently will increase the rate of release of oxygen bubbles.

Answer 7.

(a)

Parents		TTRR	TR	TR	← Gametes
Gametes	Г	tr	TtRr	TtRr	
		tr	TtRr	TtRr	\leftarrow F_1
					generation

- (i) Genotype of F₁ generation : TtRr Phenotype of F₁ generation : Tall plants bearing red flowers
- (ii) The selfing of F_1 generation TtRr will yield following gametes –TR, Tr, tR, tr

The possible combinations of these gametes are given in the following Punnett square:

TID.				
TtRr TtRr	TR	Tr	tR	tr
TR	TTRR	TTRr	TtRR	TtRr
	Tall	Tall	Tall	Tall
	plants	plants	plants	plants
	with	with red	with red	with
	red	flowers	flowers	red
	flowers		363	flowers
Tr	TTRr	TTrr	TtRr	Ttrr
	Tall	Tall	Tall	Tall
	plants	plants	plants	plants
	with	with	with red	with
	red	white	flowers	white
/ 57	flowers	flowers		flowers
tR	TtRR	TtRr	ttRR	ttRr
	Tall	Tall	Dwarf	Dwarf
C 7/	plants	plants	plants	plants
\smile	with	with red	with red	with
	red	flowers	flowers	red
	flowers			flowers
tr	TtRr	Ttrr	ttRr	ttrr
	Tall	Tall	Dwarf	Dwarf
	plants	plants	plants	plants
	with	with	with red	with
	red	white	flowers	white
	flowers	flowers		flowers

(iii) Mendel's law of independent assortment:

This law was deduced from a dihybrid cross, where simultaneous inheritance of two different characters was considered. According to this law, the alleles of two different characters assort or separate independently of one another at the time of gamete formation. The alleles are thus free to recombine and form new combinations in the subsequent generations.

- (iv) The F₂ generation phenotypes would be –
- Tall plants with red flowers
- 2. Tall plants with white flowers
- 3. Dwarf plants with red flowers
- 4. Dwarf plant with white flowers

Out of these, tall plants with white flowers and dwarf plants with red flowers were the recombinants. (v) The phenotypic ratio of F_2 generation would be 9:3:3:1

Tall	Tall	Dwarf	Dwarf
plants	plants	plants	plant
with red	with	with red	with
flowers white		flowers	white
	flowers		flowers
9	3	3	1

- (b) (i) Reflex action: A reflex action is a nerve mediated spontaneous, automatic, involuntary response to a stimulus acting on a specific receptor. The route of every reflex passes through an aggregation of nervous tissue, either brain or spinal cord. Brain or spinal cord aids in transfer of sensory stimulus to motor response.
 - (ii) Power of accommodation: It refers to the ability of the eye lens to adjust its focal length to see objects at different distances clearly. The ciliary muscles contract and make the lens thicker to view nearby objects clearly, whereas they relax and make the lens thinner to focus on distant objects. The least distance of distinct vision for a normal eye is 25 cm and the maximum distance is infinity.
 - (iii) Photophosphorylation: It is the process of formation of ATP from ADP and inorganic phosphate in chloroplasts with the help of energy obtained from solar radiations.
 - **(iv) Hormone:** A hormone is a chemical substance produced by the cells of endocrine gland which are transported by circulatory system to other parts of the body, where they regulate one or more physiological processes.
 - **(v) Synapse:** A synapse is referred as an area of specialized activity between the terminal ends of axon of one neuron and the dendrites or cell body of adjacent neuron. It facilitates transmission of nerve impulse from one neuron to another. Conduction of nerve impulse across a synapse can be of two types *i.e.*, electrical and chemical.

BIOLOGY

2015

QUESTIONS

SECTION-I (40 Marks)

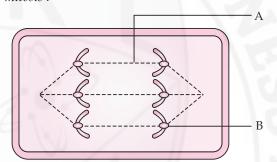
Attempt all questions from this Section.

Question 1.

- (a) Name the following:
 - The process of uptake of mineral ions against the concentration gradient using energy from cell.
 - (ii) The form in which glucose is stored in liver.
 - (iii) The vein that carries oxygenated blood.
 - (iv) The cross between two parents having one pair of contrasting characters.
 - (v) The structure formed by the villi of the embryo and the uterus of the mother.
- The statements given below are False. Rewrite the correct form of the statement by changing the word which is underlined:
 - Alpha cells of pancreas secrete Insulin.
 - (ii) Formalin is an example of an Antiseptic.*
 - (iii) <u>CNG</u> is mainly responsible for the formation of acid rain.
 - (iv) Sulphadiazine is an example of an Antiseptic.**
 - (v) Cretinism is caused due to deficiency of Adrenaline.
- Choose the correct answer from the four options given below: [5]
 - A single highly coiled tube where sperms are stored, gets concentrated and mature is known as:
 - (A) Epididymis
 - Vas efferentia
 - (C) Vas deferens
 - (D) Seminiferous tubule.
 - Chromosomes get aligned at the centre of the cell during:
 - (A) Metaphase
- (B) Anaphase
- (C) Prophase
- (D) Telophase.
- (iii) BCG vaccine is effective against :**
- (A) Cholera
- (B) Mumps
- (C) Tuberculosis
- (D) Measles
- (iv) Which one of the following is mainly associated with the maintenance of the posture?
- (A) Cerebrum
- (B) Cerebellum
- (C) Thalamus
- (D) Pons
- Answer is not given due to change in the present syllabus.

- **(v)** An example of non-biodegradable waste is:
- (A) Vegetable peels
- (B) Sewage
- (C) Livestock waste
- (D) DDT
- **(d)** *Mention the exact location of the following structures :*
 - (i) Thylakoids
- (ii) Organ of Corti

- (iii) Lenticels
- (iv) Bicuspid Valve
- (v) Loop of Henle The diagram given below represents a certain stage of



- Identify the stage of cell division.
- (ii) Name the parts labelled A and B.
- (iii) What is the unique feature observed in this stage?
- (iv) How many daughter cells are formed from this type of cell division?
- Given below is an example of a certain structure and its special functional activity. On a similar pattern fill in the blanks with suitable functions:

Example: Chloroplast and Photosynthesis:

- Xylem and
- (ii) Ciliary Body and
- (iii) Seminiferous Tubule and
- (iv) Thyroid Gland and
- (v) Eustachian Tube and
- Rewrite and complete the following sentences by inserting the correct word in the space indicated: [5]
 - (i) The phenomenon of loss of water through a cut stem or injured part of plant is called
 - (ii) is the scientific name of garden pea, which Mendel used for his experiments.
 - (iii) A fluid that occupies the larger cavity of the eye ball behind the lens is
 - (iv) Oxygen combines with haemoglobin present in RBC and forms
 - (v) causes corrosion of the marble or brick surface.

(h) Match the items in Column 'A' with those which are most appropriate in Column 'B'. Rewrite the matching pairs as shown in the example: [5]

Example: Fibrinogen—Clotting of blood.

Column A	Column B
(1) Allele	(a) Control of automobile
(2) Leydig cells	exhaust
	(b) Tourniquet
(3) Utriculus	(c) Alternate forms of
(4) Snake bite**	genes
(5) Euro IV norms	(d) Dynamic equilibrium
	(e) Testosterone
	(f) Sudden change in genes
	(g) Static equilibrium

SECTION-II (40 Marks)

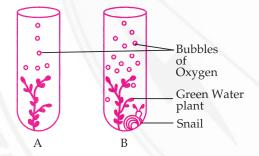
Attempt any four questions from this Section.

Question 2.

(a) The diagram below shows two test-tubes A and B.

Test-tube A contains a green water plant. Test-tube
B contains both a green water plant and a snail. Both
Test-tubes are kept in sunlight. Answer the questions
that follow:

[5]

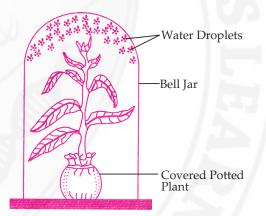


- (i) Name the physiological process that releases the bubbles of oxygen.
- (ii) Explain the physiological process as mentioned above in Q. 2 (a) (i).
- (iii) What is the purpose of keeping a snail in test-tube 'B'?
- (iv) Why does test-tube 'B' have more bubbles of oxygen?
- (v) Give an example of a water plant that can be used in the above experiment.
- (vi) Write the overall chemical equation for the above process.
- (b) Give the biological/technical terms for the following: [5]
 - (i) A mixture of smoke and fog.
 - (ii) Capacity of our body to resist diseases.**
- ** Answer is not given due to change in the present syllabus.

- (iii) Fixing of developing zygote on the uterine wall.
- **(iv)** The permanent stoppage of menstruation at about the age of 45 years in a female.
- **(v)** The hormone increasing reabsorption of water by kidney tubules.
- **(vi)** A thin membrane covering the entire front part of the eye.
- **(vii)** The lens of eye losing flexibility resulting in a kind of long-sightedness in middle aged people.
- **(viii)** The number of persons living per square kilometre at any given time.
- (ix) The sound produced when the atrio-ventricular valves close in the heart.
- (x) The process by which white blood cells engulf bacteria.

Question 3.

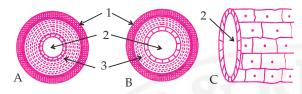
(a) An apparatus as shown below was setup to investigate a physiological process in plants. The setup was kept in sunlight for two hours. Droplets of water were then seen inside the bell jar. Answer the questions that follow:



- (i) Name the process being studied.
- (ii) Explain the process named above in Q. 3. (a) (i).
- (iii) Why was the pot covered with a plastic sheet?
- (iv) Suggest a suitable control for this experiment.
- **(v)** Mention two ways in which this process is beneficial to plants.
- **(vi)** List three adaptations in plants to reduce the above mentioned process.
- **(b)** *Briefly answer the following questions:* [5]
 - **(i)** State two reasons for the increase of population in India.
 - (ii) What is the significance of amniotic fluid?
 - (iii) What is the function of ear ossicles?
 - (iv) Mention any two activities of the WHO.**
 - (v) State Mendel's law of Dominance.

Question 4.

(a) The diagram given below are cross-sections of blood vessels: [5]

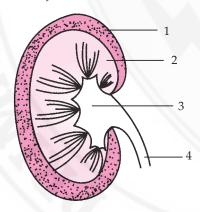


- (i) Identify the blood vessels A, B and C.
- (ii) Name the parts labelled 1 to 3.
- (iii) Name the type of blood that flows through A.
- **(iv)** Mention one structural difference between A and B.
- **(v)** In which of the above vessels does exchange of gases actually take place?
- (b) Differentiate between the following pairs on the basis of what is mentioned within brackets: [5]
 - (i) Diffusion and Osmosis (Definition)
 - (ii) RBC and WBC (Shape)
 - (iii) Tubectomy and Vasectomy (Part cut and tied)
 - (iv) Vasopressin and Insulin (Deficiency disorder)
 - (v) Rods and Cones of Retina (Type of Pigment).

Question 5.

(a) The diagram given below shows a section of a human kidney. Study the diagram carefully and answer the questions that follow:

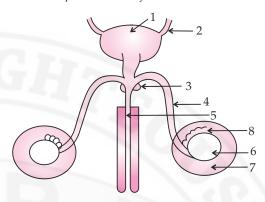
[5]



- (i) Label the parts numbered 1 to 4.
- (ii) Why does part '2' have a striped appearance?
- (iii) What is the fluid that passes down part '4'? Name the main nitrogenous waste present in it.
- **(iv)** Mention the structural and functional units of kidneys.
- (v) Name the two major steps in the formation of the fluid mentioned in Q. 5 (a) (iii).
- **(b)** *Draw neat and labelled diagrams of the following* : [5]
 - (i) Malpighian Capsule.
 - (ii) A Myelinated Neuron.

Question 6.

(a) The diagram given below shows the male urinogenital system of a human being. Study the diagram and answer the questions that follow: [5]

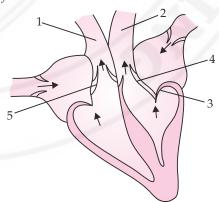


- (i) Label the parts numbered 1 to 8.
- (ii) Name the corresponding structure of part (4) in female reproductive system.
- (iii) What is the role of part 7?
- (b) In a homozygous plant, round seeds (R) are dominant over wrinkled seeds (r): [5]
 - **(i)** Draw a Punnett square to show the gametes and offspring when both the plants have heterozygous round seeds (Rr).
 - (ii) Mention the Phenotype and Genotype ratios of the offsprings in F_2 generation.
 - (iii) Name the sex chromosomes in human males and females.
 - (iv) Briefly explain the term 'Mutation'.
 - **(v)** What is the number of chromosomes in the gametes of human beings?

Question 7.

(a) The diagram below represents the human heart in one phase of its functions.

Study the diagram carefully and answer the questions that follows: [5]



- (i) Name the phase.
- **(ii)** Which part of the heart is contracting in this phase? Give a reason to support your answer.
- (iii) Name the parts labelled 1 to 4.

- (iv) What type of blood flows through '2'?
- (v) State the function of the part numbered '5'.
- (vi) Name the membrane that covers the heart.
- **(b)** *Explain the following terms :*
 - **(i)** *Greenhouse effect*
- (ii) Turgor pressure

[5]

- (iii) Selective reabsorption (iv) Natality
- (v) Pulse

Answers

SECTION-I

Answer 1.

- (a) (i) Active Transport
- (ii) Glycogen
- (iii) Pulmonary veins
- (iv) Monohybrid
- (v) Placenta
- (b) (i) Glucagon
- (iii) SO₂
- (v) Thyroxine
- (c) (i) (A) Epididymis (iv) (B) Cerebellum
- (ii) (A) Metaphse (v) (D) DDT
- (d) (i) Present in each granum of the chloroplast.

 - (ii) Present in the cochlea of internal ear.
 - (iii) Present in the epidermis of the stems of woody plants.
 - (iv) Present in between the left atrium and left
 - (v) Present in the medulla region of the kidney and conncets PCT with DCT.
- Anaphase (i)
 - (ii) A—Spindle fibre
- B—Centromere
- (iii) Two sister chromatids of each chromosome separate and are drawn apart towards opposite
- (iv) Two daughter cells are formed from this type of cell division.
- **(f) (i)** Xylem and Water transport.
 - (ii) Ciliary body and accommodation of eye lens.
 - (iii) Seminiferous tubule and Spermatogenesis
 - (iv) Thyroid gland and Secretion of thyroxine
 - (v) Eustachian tube and Equalising air pressure.
- (g) (i) Bleeding
- (ii) Pisum sativum
- (iii) Vitreous humour (iv) Oxy-haemoglobin
- (v) Acid rain

(h)

	Column A		Column B
1	Allele	(c)	Alternate forms of genes
2	Leydig cells	(e)	Testosterone
3	Utriculus	(g)	Static equilibrium
5	Euro IV norms	(a)	Control of automobile exhaust

SECTION-II

Answer 2.

(a) (i) Photosynthesis

- (ii) Refer to ICSE Paper, 2019, Answers 3 (a) (iii).
- (iii) To increase the rate of photosynthesis by releasing CO₂. This also suggests that both respiration and photosynthesis are needed to maintain O2 and CO2 concentration in the atmosphere.
- (iv) When snail respires, concentration of CO₂ increases which enhances the rate of photosynthesis.
- (v) Hydrilla
- (vi) $6CO_2 + 12H_2O -$ Chlorophyll

 $+6H_2O + 6O_2$

- Smog (iii) Implantation
 - (iv) Menopause
- (v) Antidiuretic Hormone (ADH)
- (vi) Conjunctiva (vii) Presbyopia
- (viii) Population density
- (ix) LUBB
- (x) Phagocytosis

Answer 3.

- (a) (i) Transpiration.
 - (ii) Transpiration is the evaporative loss of water from the aerial parts (leaves and stems) of the plant.
 - (iii) To prevent evaporation of water from the soil.
 - (iv) An empty polythene bag with its mouth fied and kept in sunlight will show no droplets of water inside.
 - (v) Benefits of transpiration:
 - Excess water is removed by plants which creates a suction force in the stem. This helps to pull up absorbed water and minerals from roots.
 - Because of the release of water from plant, transpiration contributes towards lowering the temperature.
 - (vi) Refer to ICSE Paper, 2019, Answer 5 (a) (iv).
- Reasons for the increase of population in (b) (i) India:
 - 1. Low marriage age. **2.** Illiteracy.
 - Most Indian families desire to have at least one male child. Hence, a couple produces several children till a son is born.

- (ii) Amniotic fluid acts as shock absorber and Answer 5. protects the embryo from mechanical jerks. It also maintains even pressure all around the embryo.
- (iii) Ear ossicles transmit vibrations to the oval window which sets the cochlear fluid into
- (v) Refer to ICSE Paper, 2019, Answer 6 (a) (iv).

Answer 4.

- A- Artery B- Vein (a) (i) C-Capillary
 - (ii) 1. Tunica externa/connective tissue layer
 - 2. Lumen
 - 3. Tunica media/Muscular layer
 - (iii) Oxygenated blood flows through A.
 - (iv) Arteries are thick-walled and do not have valves. Veins are thin-walled and have valves.
 - (v) The exchange of gases takes place in C (capillaries).

(b) (i)

` '	
Diffusion	Osmosis
It is the movement of the molecules of a substance from higher concentration towards the lower concentration when the two substances are in direct contact.	It is the movement of solvent molecules through a semipermeable membrane from a less concentrated solution to a more concentrated
A \	solution.

RBC	WBC
Biconcave disc, non-nucleated.	Irregular (amoeboid), nucleated.

(iii)

Vasectomy	Tubectomy
Sperm duct is cut	Cutting of the
and tied at both	fallopian tubes and
cut ends in male	tied the cut ends to
to block the path	prevent the passage
sperms from the	of ova down the
testes.	fallopian tube.

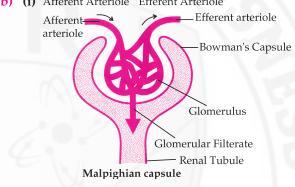
(iv)

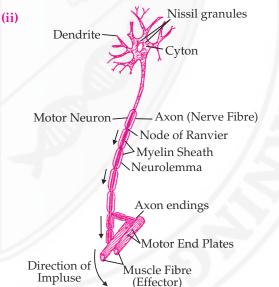
Vasopressin	Insulin
Diabetes insipidus	Diabetes mellitus

(v)

Rods	Cones
Rhodopsin	Iodopsin

- (a) (i) 1. Cortex
- 2. Medulla
- 3. Pelvis
- 4. Ureter
- (ii) Medulla has a striped appearance because the straight tubules and blood vessels are associated with the renal pyramids, present in renal medulla.
- (iii) Fluid that passes down the ureter is urine. Its main nitrogenous waste is urea.
- (iv) Nephron
- (v) 1. Ultrafiltration
 - 2. Tubular reabsorption
- (b) (i) Afferent Arteriole Efferent Arteriole





Myelinated Neuron

Answer 6.

- (a) (i) 1. Urinary Bladder
- 2. Ureter
- 3. Prostate glands
- 4. Vas deferens
- **5.** Urethra
- **6.** Testis
- 7. Scrotum
- 8. Epididymis
- (ii) Fallopian tube or oviduct.
- (iii) The high temperature of body does not permit maturation of sperms. Thus the scrotum

suspends the testis outside the body at a lower temperature suitable for spermatogenesis.

(b) (i) Homozygous round seed —RR

Homozygous wrinkled seed —rr

RR × rr

Gametes: — Rr

F₁ generation — All Round seeds

0	R	r	
R	RR (Round)	Rr (Round)	
r Rr rr (Round) (Wrinkled)			
	F ₂ generation		

(ii) F₂ generation:

Phenotypic ratio – 3:1

Genotypic ratio – 1:2:1

(iii) Sex chromosomes in human males and females are known as allosomes.

Males: XY Females: XX

- (iv) A chemical change in the gene which may produce new traits that can be inherited, is known as mutation.
- **(v)** Number of chromosomes in the gametes of human beings is 23.

Answer 7.

- (a) (i) Ventricular systole
 - (ii) Both ventricles are contracting in this phase, because both bicuspid and tricuspid valves are

closed in order to prevent the backflow of blood into atria and the semilunar valves are open.

- (iii) 1. Pulmonary artery
 - **2.** Aorta
 - 3. Aortic Bicuspid valve
 - 4. Semilunar valve
- (iv) '2' carries oxygenated blood.
- (v) Part 5 is pulmonary semilunar valve through which blood passes into pulmonary artery and prevents the backflow of blood into the right ventricle.
- (vi) Pericardium.
- (b) (i) Greenhouse effect: Certain gases especially CO₂, methane (CH₄) and nitrogen oxides accumulating in the atmosphere prevent the escape of heat, thus warming the air. This is known as greenhouse effect.
 - (ii) Turgor pressure: It is the pressure of the cell contents on the cell wall. It results due to the movement of water into the cell through osmosis.
 - (iii) Selective reabsorption: The reabsorption of water and some other usable substances from the glomerular filtrate in the renal tubule. This reabsorption occurs only to the extent that the normal concentration of blood is undisturbed.
 - **(iv) Natality**: It is the number of children born per 1000 people of population in a year.
 - (v) Pulse: The throb in the arteries caused due to the contraction of left ventricle of the heart.

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BIOLOGY

2014

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- (i) The part of the brain associated with memory.
- (ii) The ear ossicle which is attached to the tympanum.
- (iii) The type of gene, which in the presence of a contrasting allele is not expressed.
- (iv) The hormone secreted by islets of langerhans.
- **(v)** The process of conversion of ADP into ATP during photosynthesis.
- (b) State the main function of the following: [5]
 - (i) Cerebrospinal fluid
 - (ii) Eustachian tube
 - (iii) Suspensory ligament of the eye
 - (iv) Sperm duct
 - (v) Lenticels
- (c) Copy and complete the following by filling in the blanks 1 to 5 with appropriate words: [5]
 - The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called......
 - (1). As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the......
 - (2) follicle. The process of releasing the egg from the ovary is called......(3). The ovum is picked up by the oviduct funnel and fertilisation takes place in the.....(4). In about a week the blastocyst gets fixed in the endometrium of the uterus and this process is called.....(5).
- (d) Given below are six sets with four terms each. In each set one term is odd 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 one has been done as an example.

Example: Calyx, Corolla, Stamens, Midrib

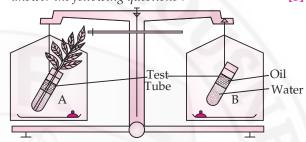
Odd term : Midrib

Category: Parts of a flower.

- (i) Haemoglobin, Glucagon, Iodopsin, Rhodopsin.
- (ii) Urethra, Uterus, Urinary bladder, Ureter.
- (iii) Transpiration, Photosynthesis, Phagocytosis, Guttation.
- (iv) Cyton, Photon, Axon, Dendron.
- (v) Oxytocin, Insulin, Prolactin, Progesterone.

(e) The figure given below represents an experimental set up with a weighing machine to demonstrate a particular process in plants. The experimental set up was placed in bright sunlight. Study the diagram and answer the following questions:

[5]



- (i) Name the process intended for study.
- (ii) Define the above mentioned process.
- (iii) When the weight of the test tube (A and B) is taken before and after the experiment, what is observed? Give reasons to justify your observation in A and B.
- **(iv)** What is the purpose of keeping the test tube B in the experimental set up?
- (f) Match the items given in Column A with the most appropriate ones in Column B and rewrite the correct matching pairs from Column A and Column B: [5]

S. No.	Column A	Column B
1.	Pituitary gland	(a) Testosterone
2.	Sulphur dioxide	(b) Calcium
3.	Seminiferous tubules	(c) Growth hormone
4.	Clotting of blood	(d) Acid rain
5.	Guttation	(e) Sperms
		(f) Global warming
		(g) Magnesium
		(h) Hydathodes

- (g) Choose the correct answer from the options given below: [5]
 - (i) Cretinism and Myxoedema are due to:
 - (A) Hypersecretion of thyroxin
 - (B) Hypersecretion of growth hormone
 - (C) Hyposecretion of thyroxin.
 - (D) Hyposecretion of growth hormone.
 - **(ii)** Which of the following is not a natural reflex action?

- (A) Knee-jerk.
- (B) Blinking of eyes due to strong light.
- (C) Salivation at the sight of food.
- (D) Sneezing when any irritant enters the nose.
- (iii) After mitotic cell division, a female human cell will have:
- (A) 44 + xx chromosome.
- (B) 44 + xy chromosome.
- (C) 22 + x chromosome.
- (D) 22 + y chromosome.
- (iv) The antibiotic penicillin is obtained from:
- (A) Protozoan
- (B) Bacteria
- (C) Virus
- (D) Fungus
- (v) The site of maturation of human sperms is the:
- (A) Seminiferous tubule
- (B) Interstitital cells
- (C) Epididymys
- (D) Prostate gland

(i) Tricuspid valve

- **(h)** State the exact location of the following:
 - ollowing : (ii) Amnion

[5]

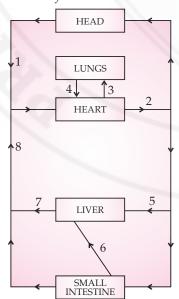
- (iii) Yellow spot
- (iv) Seminal vesicle
- (v) Adrenal gland

SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

- (a) Differentiate between the following pairs on the basis of what is mentioned within brackets: [5]
 - (i) Spinal nerves and Cranial nerves (Number of nerves).
 - (ii) Near vision and Distant Vision (shape of the eye lens)
 - (iii) Corpus callosum and Corpus luteum. (function).
 - (iv) Turgor pressure and wall pressure. (Explain).
 - (v) Disinfectant and Antiseptic (Definition).*
- **(b)** The diagram below represents the simplified pathway of the circulation of blood. Study the same and answer the questions that follow:

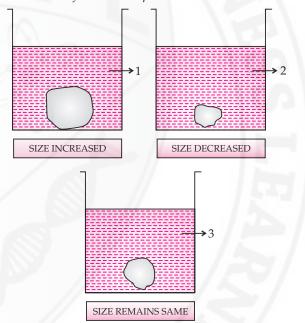


** Answer is not given due to change in the present syllabus.

- (i) Name the blood vessels labelled 1 and 2.
- (ii) State the function of blood vessels labelled 5 and 8
- (iii) What is the importance of the blood vessel labelled 6?
- **(iv)** Which blood vessel will contain a high amount of glucose and amino acids after a meal?
- (v) Draw a diagram of the different blood cells as seen in a smear of human blood.

Question 3.

(a) A candidate in order to study the process of osmosis has taken 3 potato cubes and put them in 3 different beakers containing 3 different solutions. After 24 hours, in the first beaker the potato cube increased in size, in the second beaker the potato cube decreased in size and in the third beaker there was no change in the size of the potato cube. The following diagram shows the result of the same experiment:

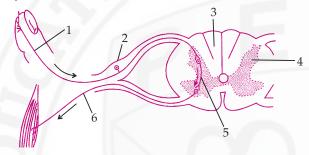


- (i) Give the technical terms of the solutions used in beakers 1, 2 and 3.
- (ii) In beaker 3 the size of the potato cube remains the same. Explain the reason in brief.
- (iii) Write the specific feature of the cell sap of root hairs which helps in absorption of water.
- (iv) What is osmosis?
- **(v)** How does a cell wall and a cell membrane differ in their permeability?
- (b) A potted plant was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours. One of the leaves was covered with black paper in the centre. The potted plant was then placed in sunlight for a few hours. [5]
 - (i) What aspect of photosynthesis was being tested?

- (ii) Why was the plant placed in the dark before beginning the experiment?
- (iii) During the starch test why was the leaf:
- (1) boiled in water
- (2) boiled in methylated spirit.
- **(iv)** Write a balanced chemical equation to represent the process of photosynthesis.
- (v) Draw a neat diagram of a chloroplast and label its parts.

Question 4.

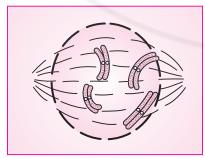
(a) The diagram given below is a representation of a certain phenomenon pertaining to the nervous system. Study the diagram and answer the following questions:



- (i) Name the phenomenon that is being depicted.
- (ii) Give the technical term for the point of contact between the two nerve cells.
- (iii) Name the parts 1, 2, 3 and 4.
- (vi) Write the functions of parts 5 and 6.
- (v) How does the arrangement of neurons in the spinal cord differ from that of the brain?
- (b) Give scientific reasons for the following statements: [5]
 - (i) Use of CFC is banned in many countries.
 - (ii) We cannot distinguish colours in moonlight.
 - (iii) Balsam plants wilt during mid-day even if the soil is well watered.
 - (iv) Carbon monoxide is highly dangerous when inhaled.
 - (v) A person after consuming alcohol walks clumsily.

Question 5.

(a) Given below is a diagram representing a stage during mitotic cell division. Study it carefully and answer the questions that follow: [5]



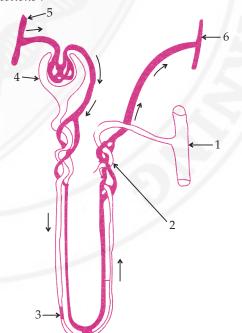
** Answer is not given due to change in the present syllabus.

- **(i)** Is it a plant cell or an animal cell? Give a reason to support your answer.
- (ii) *Identify the stage shown.*
- (iii) Name the stage that follows the one shown here. How is that stage identified?
- **(iv)** How will you differentiate between mitosis and meiosis on the basis of the chromosome number in the daughter cells?
- **(v)** *Draw a duplicated chromosome and label its* parts.
- (b) (i) Name the disease for which following types of vaccines are given:**

 [5]
 - (1) Salk's Vaccine.
 - (2) B.C.G.
 - (ii) Give one example of each of the following:
 - (1) A water pollutant.
 - (2) An aquatic plant used in the lab to demonstrate
 - O₂ liberation during photosynthesis.
 - (3) An antibiotic.
 - (4) A nitrogenous base in DNA.
 - (iii) Expand the following biological abbreviations:
 - (1) ATP
 - (2) TSH
 - (3) DPT**
 - **(4)** *DNA*

Question 6.

(a) The given diagram represents a nephron and its blood supply. Study the diagram and answer the following questions: [5]



- (i) Label parts 1, 2, 3 and 4.
- (ii) State the reason for the high hydrostatic pressure in the glomerulus.

- (iii) Name the blood vessel which contains the least amount of urea in this diagram.
- (iv) Name the two main stages of urine formation.
- (v) Name the part of the nephron which lies in the renal medulla.
- **(b)** Briefly explain the following terms:
 - (i) monohybrid cross.
- (ii) Biomedical waste.
- (iii) Innate immunity.**
- (iv) Diapedesis.
- (v) Hormones.

Question 7.

- (a) (i) State any two harmful effects of noise pollution on human health. [5]
 - (ii) Categorize the following activities as per the functions of the Red Cross Society and the WHO:**
 - (1) To suggest quarantine measures to prevent spread of disease.
 - (2) Humanitarian services to victims of war.
 - (3) To educate people in accident prevention.
 - (4) To promote projects for research on disease.

- (iii) Write any two major reasons for the population explosion in India.
- (iv) State Mendel's law of segregation.
- **(b)** *Give technical terms for the following :*
 - **(i)** A method of contraception in which the sperm duct is cut and ligated.

[5]

- (ii) Statistical study of human population.
- (iii) The protective covering of the heart.
- (iv) A sudden heritable change in the gene.
- (v) Repeated units of DNA molecule.
- (vi) The fluid portion of blood.
- (vii) The nerve that transmits impulses from the ear to the brain.
- **(viii)** Group of hormones which influence other endocrine glands to produce hormones.
- (ix) Thin walled sac of skin that covers the testes.
- (x) The permanent stoppage of the menstrual cycle in a woman aged 50 years.

Answers

SECTION-I

Answer 1.

- (a) (i) Cerebrum
- (ii) Malleus
- (iii) Recessive
- (iv) Insulin/Glucagon
- (v) Photophosphorylation
- (b) (i) It acts as a cushion to protect the brain from jerks and shocks.
 - (ii) It equalizes air pressure on both sides of the ear drum helping it to vibrate freely.
 - (iii) It helps to suspend the lens in the eye ball cavity.
 - **(iv)** It carries sperms from the epididymis to the urethra.
 - **(v)** They allow diffusion of gases for respiration and photosynthesis.
- (c) 1. Follicle.
- 2. Graafian
- 3. Ovulation
- 4. Oviduct
- 5. Implantation
- (d) (i) Odd—Glucagon
 Category—Pigments
 - (ii) Odd—Uterus
 - Category—Excretory organs
 - (iii) Odd—Phagocytosis
 - Category—Plant processes
 - (iv) Odd—Photon Category—Parts of neuron(v) Odd—Insulin
- Category—Female hormones.
 (e) (i) Transpiration
 - (ii) It is the loss of water in the form of water vapour from the aerial parts of the plant.
- ** Answer is not given due to change in the present syllabus.

- (iii) Weight of test tube A will decrease after the experiment because water will be lost from it through the leaves by transpiration. Weight of test tube B will remain same after the experiment because water will not be lost by transpiration as there is no plant in it and nor by evaporation as oil is spread over it, which will not allow evaporation.
- (iv) It is a control experiment where the purpose of using test tube B is to compare the level of water in both test tubes. Test tube B is used here as a control.

S. No.	Column A	Column B	
1.	Pituitary gland	(c) Growth hormone	
2.	Sulphur dioxide	(d) Acid rain	
3.	Seminiferous tubules	(e) Sperms	
4.	Clotting of blood	(b) Calcium	
5.	Guttation	(h) Hydathodes	

- (g) (i) (C) Hyposecretion of thyroxin.
 - (ii) (C) Salivation at the sight of food.
 - (iii) (A) 44 + xx chromosome
 - (v) (C) Epididymis
- (h) (i) Tricuspid valve—Between right auricle and right ventricle.
 - **(ii) Amnion**—Around the embryo in uterus and inner to chorion.

- (iii) Yellow spot—On the horizontal median axis of eye ball in retina.
- **(iv)** Seminal vesicle—Lobulated glands located between the posterior surface of the urinary bladder and the rectum.
- **(v) Adrenal gland**—On top of each kidney as a cap.

SECTION-II

Answer 2.

(a) (i)

Spinal nerve	Cranial nerve
31 pairs	12 pairs
(ii)	

Near vision		Distant vision
More convex rounded.	or	More flattened.

(iii)

Corpus callosum	Corpus luteum
Transfer information from one cerebral hemisphere to the other.	It secretes progesterone and oestrogen.

(iv)

Turgor pressure	Wall pressure
It is the outward pressure exerted by	It is the inward pressure exerted by the
the contents of a	cell wall on its contents
turgid cell on its cell wall.	(protoplasm).

- (b) (i) 1. Anterior vena cava
 - 2. Aorta
 - (ii) Blood vessel 5 carries oxygenated blood to the liver.

Blood vessels 8 brings deoxygenated blood from lower parts of the body to heart.

- (iii) It brings all the digested food and deoxygenated blood from parts of alimentary canal to liver.
- (iv) Blood vessel number 6. *i.e.*, hepatic portal vein.

(v)







Red blood cells

White blood cells

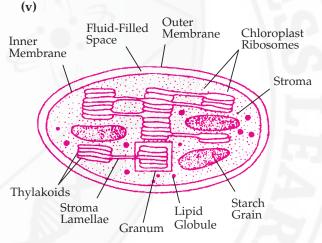
Platelets

Answer 3.

- (a) (i) Beaker 1: Hypotonic solution Beaker 2: Hypertonic solution Beaker 3: Isotonic solution
 - (ii) In beaker 3 the size of potato cube remains the same because of isotonic solution which has same concentration of solutes as that of potato cells. So, water is neither lost nor gained by the potato cells.

- (iii) Cell sap of root hairs is much more concentrated than the soil solution and this causes entry of water into the root cells.
- (iv) Osmosis is the movement of water molecules from a more dilute solution having high water potential to a less dilute solution having lower water potential, through a semi-permeable membrane.
- (v) Cell wall is freely permeable while cell membrane is selectively permeable.
- **(b) (i)** That light is necessary for photosynthesis.
 - (ii) To remove all pre-existing starch from the leaves of the plant.
 - (iii) (1) The leaf was boiled in water to destroy enzymes so that further chemical changes do not take place in the leaf.
 - **(2)** To dissolve the chlorophyll.

(iv)
$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$



Structure of Chloroplast

Answer 4.

- (a) (i) Pathway of reflex action or reflex arc
 - (ii) Synapse
 - (iii) 1. Sensory neuron
 - 2. Dorsal root ganglions
 - 3. White matter
 - 4. Gray matter
 - (iv) Function of part 5–It receives messages from sensory neuron and passes it to the motor neuron. Function of part 6–It passes impulses from the main nervous system to the effector organ.
 - (v) In the brain, the cell bodies of neurons lie in the cortex *i.e.*, the outer region (gray matter) and axons lie on the inner region (white matter). In the spinal cord, the cell bodies lie in the medullary region (inner gray matter) and axons lie on the outer side *i.e.*, cortex (outer white matter).

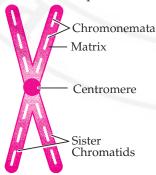
- (b) (i) Chlorine from CFC breaks ozone molecules (b) (ii) (1) Pesticides/Sewage into oxygen and nascent oxygen. CFC reacts with ozone in the atmosphere and decreases its concentration. This has resulted in a thinner layer of ozone in the air specially over the polar region. Harmful ultraviolet rays would be able to enter the earth's atmosphere through this thin ozone layer and cause damage to life and diseases like skin cancer in humans. Therefore, its use is banned in many countries.
 - (ii) In dim light, colours cannot be distinguished because the rod cells are working in dim light but they do not detect colours. Cone cells detect colours but they do not work in dim light like that of moon.
 - (iii) Transpiration rate in such plants is very high during mid-day and exceeds the water absorption rate of the roots. So, more water is lost than absorbed. This water deficiency in cells causes them to loose turgidity and the plants get wilted. (iv) Carbon monoxide combines haemoglobin of RBCs and forms a stable and irreversible complex compound known as carboxyhaemoglobin. This decreases the oxygen carrying capacity of blood, sometimes resulting death of person.
 - (v) Alcohol affects the cerebellum which is the center of body balance and co-ordination. Due to the alcohol affect, the cerebellum is unable to co-ordinate muscular movements properly.

Answer 5.

- (a) (i) It is plant cell, because centrosome is absent and spindle apparatus is not connected to it.
 - (ii) Prophase.
 - (iii) Metaphase. In this stage, the chromosome lies in one plane at equator and gets attached to a spindle fibre by its centromere.
 - (iv) Mitosis—Chromosome number daughter cells is the same as parent cell.

Meiosis—Chromosome number of the daughter cells is half as that of the parent cell.





Structure of Chromosome

- - (2) Hydrilla
 - (4) Adenine
 - (iii) (1) Adenosine Triphosphate
 - (2) Thyroid Stimulating Hormone
 - (4) Deoxyribo Nucleic Acid

Answer 6.

- (a) (i) 1– Collecting duct
 - 2- Distal convoluted tubule
 - 3- Descending limb of Loop of Henle
 - 4- Bowman's capsule
 - (ii) The afferent arteriole entering the Bowman's capsule is wider than the efferent arteriole which leaves it. So more blood is entering and less blood is moving out of the glomerulus which creates high hydrostatic pressure in the glomerulus.
 - (iii) Renal vein.
 - (iv) Ultrafiltration and Reabsorption.
 - (v) Loop of Henle.
- Monohybrid cross is a cross between two pure breeding different varieties of organisms taking the alternative traits of a single character e.g., cross between pure tall and pure dwarf variety.
 - (ii) Biomedical waste is the waste that is generated in the hospitals, nursing homes etc. like used bottles, syringes, plastic, bandages etc.
 - (iv) Diapedesis is the movement of the blood cells, especially white blood cells, through intact capillary walls into surrounding body tissue.
 - (v) Hormones are chemical messengers produced by endocrine glands which move through blood to reach their target organs.

Answer 7.

- (a) (i) 1. It causes hypertension.
 - 2. It causes hearing impairment.
 - (iii) 1. Desire for a male child.
 - 2. Economic reasons as children are considered to be helping hands to increase the family income.
 - (iv) Refer to ICSE Paper, 2018 Answer 7 (b) (iv).
- (b) (i) Vasectomy
- (ii) Demography
- (iii) Pericardium
- (iv) Mutation
- (v) Nucleotides
- (vi) Plasma
- (vii) Auditory nerve (viii) Tropic hormones
- (ix) Scrotum
- (x) Menopause

BIOLOGY

2013

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

- [5
- (i) The cell body of a nerve cell.
- (ii) The waxy layer on the epidermis of the leaf meant to reduce transpiration.
- (iii) A non-biodegradable pesticide.
- (iv) The physical expression of genes in an individual.
- **(v)** Knot-like mass of blood capillaries inside the Bowman's capsule.
- **(b)** State the exact location of the following:
- [5]

- (i) Chloroplast
- (ii) Incus
- (iii) Corpus callosum (iv) Guard cells
- (v) Pulmonary semilunar valve.
- (c) 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 one has been done as an example:

Example: Fructose, Sucrose, Glucose, Calcium.

Odd term: Calcium

Category: Carbohydrates.

- (i) Carbonic acid, acetic acid, benzoic acid, boric acid.**
- (ii) Saliva, bile, sweat, tears.
- (iii) Cretinism, myxedema, simple goitre, acromegaly.
- (iv) Sneezing, coughing, blinking, typing.
- (v) Semicircular canals, cochlea, tympanum, utriculus.
- (d) Match the items in Column A with that which is most appropriate in Column B. Rewrite the matching pair.

[5]

Column A	Column B
(1) Testis	(a) Kidney
(2) Poliomyelitis**	(b) Water vapour
(3) Transpiration	(c) Prostate gland
(4) Clotting of blood	(d) Iron
(5) Uriniferous tubule	(e) Uterus
	(f) Gonad
	(g) Salk's vaccine

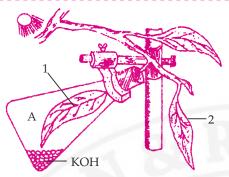
** Answer is not given due to change in the present syllabus.

(h) Water droplet
(i) Calcium
(j) TAB vaccine

- (e) Choose the correct answer from the four options given below: [5]
 - **(i)** The cell component visible only during cell division:
 - (A) Mitochondria
- (B) Chloroplast
- (C) Chromosome
- (D) Chromatin
- (ii) Pulse wave is mainly caused by the:
- (A) Systole of atria
- (B) Diastole of atria
- (C) Systole of the left ventricle
- (D) Systole of the right ventricle
- (iii) The recessive gene is one that expresses itself in:
- (A) Heterozygous condition
- (B) Homozygous condition
- (C) F_2 generation
- (D) Y-linked inheritance.
- **(iv)** A gland which secretes both hormone and enzyme is the:
- (A) Pituitary
- (B) Pancreas
- (C) Thyroid
- (D) Adrenal
- **(v)** The ventral root ganglion of the spinal cord contains cell bodies of the:
- (A) Motor neuron
- (B) Sensory neuron
- (C) Intermediate neuron
- (D) Association neuron.
- Given below is an example of certain structures and their special functional activities. [5]

For example: Eye and vision, On a similar pattern complete the following:

- (iii) Neurotransmitters:....
- (iv) Iris of the eye:.....
- (v) Placenta:....
- (g) The figure given below represents an experiment to demonstrate a particular aspect of photosynthesis. The alphabet 'A' represents a certain condition inside the flask.



- (i) What is the aim of the experiment?
- (ii) Identify the special condition inside the flask.
- (iii) Name an alternative chemical that can be used instead of KOH.
- **(iv)** In what manner do the leaves 1 and 2 differ at the end of the starch test?
- (h) Given below are five groups of terms. In each group arrange and rewrite the terms in the correct order so as to be in a logical sequence. [5]

For example:

Question: Implantation, Parturition, Ovulation, Gestation, Fertilization.

Answer: Ovulation, Fertilization, Implantation, Gestation, Parturition.

- (i) Spongy cells, Upper epidermis, Stoma, Palisade tissue, Substomatal space.
- (ii) Spinal cord, Motor neuron, Receptor, Effector, Sensory neuron.
- (iii) Endodermis, Cortex, Soil water, Xylem, Root hair.
- **(iv)** *Metaphase, Telophase, Prophase, Anaphase, Cytokinesis.*
- (v) Intestine, Liver, Intestinal artery, Hepatic Vein, Hepatic Portal Vein.

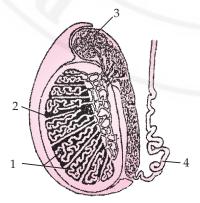
SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

(a) Given below is a diagram of the lateral section of a testis of a man. Study the same and answer the questions that follow:

[5]



** Answer is not given due to change in the present syllabus.

- (i) Label the parts numbered 1 to 4 of the diagram.
- (ii) State the functions of the parts labelled 1 and 3.
- (iii) What is the significance of the testes being located in the scrotal sac outside the abdomen?
- (iv) What is the role played by the inguinal canal?
- (v) What is semen?
- (b) Give the biological/technical terms for the following: [5]
 - (i) Chemicals found in the blood which act against antigens.**
 - (ii) A constituent that causes pollution.
 - (iii) The onset of menstruation in a young girl.
 - **(iv)** Structure which connects the placenta with the foetus.
 - (v) The fluid present between the layers of meninges.
 - (vi) Permanently open structures seen on the bark of an old woody stem.
 - **(vii)** The biological process which is the starting point of the food chain.
 - (viii) The change in an organism resulting due to stimulus.
 - (ix) An Antiseptic substance present in tears.
 - (x) A solution in which the relative concentration of water molecules and the solute on either side of the cell membrane is the same.

Question 3.

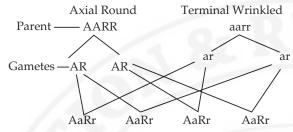
- (a) Draw a diagram of the human eye as seen in a vertical section and label the parts which suits the following descriptions relating to the:

 [5]
 - (i) Photosensitive layer of the eye.
 - **(ii)** Structure which is responsible for holding the eye lens in its position.
 - (iii) Structure which maintains the shape of the eye ball and the area of no vision.
 - (iv) Anterior chamber seen in front of the eye lens.
 - (v) Outermost transparent layer seen in front of the eye ball.
- (b) Differentiate between the following pairs on the basis of what is mentioned within brackets: [5]
 - **(i)** Photolysis and Photophosphorylation. (Definition)
 - (ii) Bicuspid valve and Tricuspid valve. (Function)
 - (iii) Vasectomy and Tubectomy. (Explain)
 - **(iv)** Cerebrum and Spinal cord. (Arrangement of nerve cells)
 - **(v)** Bowman's capsule and Malpighian capsule. (Parts included)

Question 4.

(a) Given below is a schematic diagram showing Mendel's experiment on sweet pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds (aarr). Study the same and answer the questions that follow:

[5]

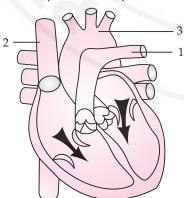


- (i) Give the phenotype of F_1 progeny.
- (ii) Give the phenotypes of F_2 progeny produced upon by the self-pollination of F_1 progeny.
- (iii) Give the phenotypic ratio of F_2 progeny.
- **(iv)** Name and explain the law induced by Mendel on the basis of the above observation.
- **(b)** Complete the following table by filling in the blanks from 1 to 10 with appropriate terms:

S. No.	Gland	Secre- tion	Function / Effect on body	
1.	Thyroid	<u>1</u>	<u>2</u>	
2.	<u>3</u>	Vaso- pressin	<u>4</u>	
3.	<u>5</u>	<u>6</u>	Promotes glucose utilization by the body cells.	
4.	Lacrimal gland	<u>Z</u>	<u>8</u>	
5.	Adrenal medulla	9	<u>10</u>	

Question 5.

(a) The diagram given below represents the human heart in one phase of its functional activities. Study the same and answer the questions that follow: [5]

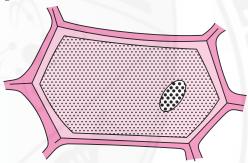


** Answer is not given due to change in the present syllabus.

- (i) Name the phase.
- (ii) Label the parts 1, 2 and 3.
- **(iii)** Which part of the heart is contracting in this phase? Give a reason to support your answer.
- **(iv)** Draw well labelled diagrams of part 1 and 2 to show the structural differences between them.
- **(b)** *Give biological reasons for the following*:
 - (i) The wall of the ventricle is thicker than the auricles.
 - (ii) The renal cortex has a dotted appearance.
 - (iii) Wooden frames of doors get jammed during the monsoon season.
 - (iv) Throat infections can lead to ear infections.
 - **(v)** The hand automatically shows the direction to turn a cycle without thinking.

Question 6.

(a) The figure given below shows the epidermal cells of an onion bulb. This cell was then transferred to a drop of sugar solution. [5]



- (i) Draw a well labelled diagram of the epidermal cell as it would appear after immersion in a strong sugar solution.
- (ii) What scientific term is used for the changes as shown in (i) above?
- (iii) What should be done to restore the cell back to its original condition?
- (iv) Give the scientific term for the recovery of the cell as a result of the step taken in (iii) above.

[5]

- (v) Define the term osmosis.
- **(b)** Briefly explain the following terms:
 - (i) Genes.
 - (ii) Cytokinesis in plant cells.
 - (iii) Guttation
 - (iv) Diabetes insipidus.
 - (v) Disinfectants.**

Question 7.

- (a) (i) Draw a well labelled diagram to show the anaphase stage of mitosis in a plant cell having four chromosomes. [5]
 - (ii) State any two harmful effects of acid rain.
 - (iii) Expand the following biological abbreviations:
 - (1) NADP
- (2) ACT

- **(b) (i)** List any two major activities of the Red Cross.**
 - **(ii)** Write any two major reasons for the population explosion in the world.
- (iii) Write the names of four nitrogenous bases in a DNA molecule. [5]

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Cyton
- (ii) Cuticle
- (iii) DDT
- (iv) Phenotype
- (v) Glomerulus
- **(b) (i) Chloroplast**: In mesophyll cells, located between upper and lower epidermis.
 - (ii) Incus: In middle ear inside tympanic cavity between malleus and stapes.
 - (iii) Corpus callosum: Thick band of nerve fibres joining two cerebral hemispheres of cerebrum.
 - **(iv) Guard cells :** Pair of guard cells surround the stomata on the upper and lower epidermis of leaf.
 - **(v) Pulmonary semilunar valve :** In right ventricle which guards the opening of pulmonary trunk.
- (c) (ii) Odd term : Bile

Category: Germ killing secretions

(iii) Odd term: Acromegaly

Category : Effects of abnormal thyroxine secretion

(iv) Odd term: Typing

Category: Unconditioned reflex

(v) Odd term: Tympanum

Category: Parts of inner ear.

(d)

Sr. Column A		Column A	Column B	
	No.			
	(1)	Testis	(f) Gonad	
	(3)	Transpiration	(b) Water vapour	
	(4)	Clotting of blood	(i) Calcium	
	(5)	Uriniferous tubule	(a) Kidney	

- (e) (i) (C) Chromosome
 - (ii) (C) Systole of left ventricle
 - (iii) (B) Homozygous condition
 - (iv) (B) Pancreas
 - (v) (A) Motor neuron
- (f) (i) Neutrophils: Engulf microbes (phagocytosis)
 - **(ii) Ureter** : Carries urine from kidneys to the urinary bladder.
 - (iii) Neurotransmitters: Carry nerve impulse.
 - **(iv)** Iris of the eye: Regulate the amount of light entering into the eye by controlling the size of pupil.
- ** Answer is not given due to change in the present syllabus.

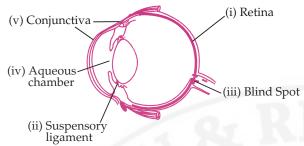
- (v) Placenta: Transfer nutrients, oxygen, etc. from materal blood to foetus.
- (g) (i) To prove that CO₂ is necessary for photosynthesis.
 - (ii) No CO₂ in the flask.
 - (iii) CaO (limestone), potassium pyrogallate.
 - **(iv)** Leaf 1– Will turn brown indicating absence of starch.
 - Leaf 2– Will turn blue-black at the end of starch test indicating presence of starch.
- (h) (i) Upper epidermis, palisade tissue, spongy cells, substomatal space, stoma.
 - (ii) Receptor, sensory neuron, spinal cord, motor neuron, effector.
 - (iii) Soil water, root hair, cortex, endodermis, xvlem.
 - (iv) Prophase, metaphase, anaphase, telophase, cytokinesis.
 - (v) Intestinal artery, intestine, hepatic portal vein, liver, hepatic vein.

SECTION-II

Answer 2.

- (a) (i) 1. Seminiferous tubules
 - 2. Testicular lobule
 - 3. Epididymis
 - 4. Vas deferens
 - (ii) 1. **Seminiferous tubules**: Sperm production, nourishment and protection of sperms.
 - **3. Epididymis** : Temporary storage and maturation of sperms.
 - (iii) Scrotal sac acts as thermoregulator. The temperature in scrotal sac remains 2–3°C lower than the, body temperature which is suitable for maturation of sperms.
 - (iv) The inguinal canal allows the descent of testes along with their ducts, blood vessels and nerves.
 - (v) Semen is a mixture of mature sperms and secretions of seminal vesicle, Cowper's gland and parostate gland. It is a viscous fluid.
- (b) (ii) Pollutant
- (iii) Menarche
- (iv) Umbilical cord (v) Cerebrospinal fluid
 - (v) ecrebiospinar naid
- (vi) Lenticels
- (vii) Photosynthesis
- (viii) Response
- (ix) Lysozyme
- (x) Isotonic

Answer 3.



(a) ligament

Vertical Section of Eye

(b) (i)

Photolysis	Photophosphorylation
The light energy	The energy rich
absorbed by	electrons released
chlorophyll splits	during photolysis of
water into hydrogen	water are used in the
and oxygen and	synthesis of ATP from
releases two	ADP.
electrons.	
	*

(ii)

Bicuspid valve	Tricuspid valve	
Prevents backflow of	Prevents backflow	
blood from right	of blood from left	
ventricle to right	ventricle to left atrium.	
atrium.		

(iii) Refer to ICSE Paper, 2015, Answer 4 (b) (iii).

(iv)

Cerebrum	Spinal cord
Outer gray matter that forms the cortex, contains cell bodies	Outer white matter contains axons. Inner gray matter contains
of neurons. Inner white matter contains nerve fibres.	cell bodies of motor and association neurons.

(v)

Bowman's	capsule	Malpighian capsule
Epithelial glomerulus capillaries).	cells, (blood	Glomerulus, Bowman's capsule.

Answer 4.

- (a) (i) Axial flowers and round seeds.
 - (ii) (a) Axial flowers and round seeds.
 - (b) Axial flowers and wrinkled seeds.
 - (c) Terminal flowers and round seeds.
 - (d) Terminal flowers and wrinkled seeds.
 - (iii) 9:3:3:1
 - **(iv)** Law of independent assortment: When there are two pairs of contrasting characters, the

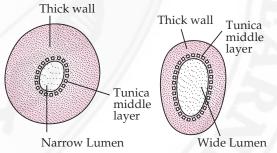
distribution of factors of each pair in the gametes is independent of the distribution of other pair of characters.

- **(b)** <u>1</u>-Thyroxine.
 - <u>2</u>–Regulates basal metabolism.
 - <u>3</u>-Posterior lobe of pituitary gland.
 - <u>4</u>–Increases reabsorption of water from urinary filtrate by kidney tubules.
 - 5-Pancreas.
 - 6-Insulin.
 - **7**-Tears.
 - <u>8</u>–Lubricates eyeball, keeps the eyes clean and protects the eyes from bacterial infection.
 - 9-Adrenaline.
 - 10-Increases heart rate and blood pressure.

Answer 5.

- (a) (i) Atrial systole
 - (ii) 1. Left pulmonary artery
 - 2. Superior vena cava
 - 3. Aorta
 - (iii) Both atria are contracting in this phase because the cuspid valves are open, allowing blood to flow into ventricles.

(iv)



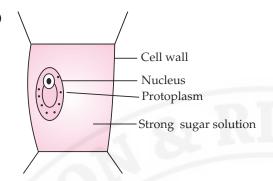
1-Artery

2-Superior vena cava

- (b) (i) Ventricles pump blood against force of gravity, which requires a great force. To apply this large force without any damage to the walls of ventricles, they are thicker.
 - (ii) Because of the presence of malpighian capsules.
 - (iii) Lignified dead cells imbibe moisture and thus swell up during the monsoon season.
 - **(iv)** Because eustachian tube connects middle ear with the throat, so infection can be passed.
 - **(v)** Because of conditioned reflex which we learn by experience and gradually responds to it unconsciously.

Answer 6.

(a) (i)

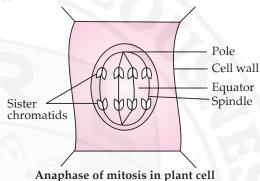


- (ii) Plasmolysis or flaccidity.
- (iii) It has to be placed in a hypotonic solution so, that water will enter the cell by endosmosis and the cell will regain its original shape.
- (iv) Deplasmolysis.
- **(v)** Osmosis is the diffusion of water molecules through a semi-permeable membrane from a region of higher concentration of water molecules to a region of lower concentration of water molecules.
- (b) (i) Genes: Gene is a basic unit of inheritance for a given character. Genes are specific sequence of nucleotides located in a chromosome which code for a particular protein which is expressed in the form of a visible character of the body.
 - (ii) Cytokinesis in plant cells: Process in which the cytoplasmic content of the cell is divided into two new daughter cells by formation of a cell plate which extends from centre to periphery of the cell is called cytokinesis.

- (iii) Guttation: In herbs, when root pressure is high and transpiration low, water is forced out in the form of drops from the margins or tips of leaves through special pores called hydathodes. This process is known as guttation.
- **(iv) Diabetes insipidus :** It is a disease caused due to the deficiency of ADH (antidiuretic hormone) in which large amount of urine is secreted, resulting loss of water from the body.

Answer 7.

(a) (i)



- (ii) 1. Destroys the soil as well as the crop.
- **2.** Acid rain corrodes the buildings, statues, etc. (iii) (1) NADP → Nicotinamide Adenine Dinucleotide Phosphate.
- (2) $ACT \rightarrow Adreno Cortico Tropin.$
- **(b) (ii) 1. Economic reasons :** Children are considered to be helping hands to increase the family income.
 - **2. Desire for a male child :** In the desire of having a son, people give birth to many children. (iii) Adenine, Guanine, Cytosine, Thymine.

BIOLOGY

2012

QUESTIONS

SECTION-I (40 Marks)

Attempt all questions from this Section.

Question 1.

(a) Name the following:

[5]

- **(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 microorganisms that can kill or inhibit the growth of other micro-organisms.**
- (b) Choose the correct answer from the four options given below each statement: [5]
 - (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.
- ** Answer is not given due to change in the present syllabus.

- (v) NADP is expanded as:
- (A) Nicotinamide adenosine dinucleotide phosphate.
- (B) Nicotinamide adenine dinucleotide phosphate
- (C) Nicotinamide adenine dinucleous phosphate
- (D) Nicotinamide adenosine dinucleous phosphate.
- (c) State the main function of the following: [5]
 - (i) Chordae tendinae
- (ii) Lymphocytes*
- (iii) Seminiferous tubule
- (iv) Thylakoids
- (v) Beta cells of pancreas
- (d) Give the exact location of the following:
 - (i) Lenticels
- (ii) Prostate gland
- (iii) Thyroid gland
- (iv) Centrosome
- (v) Mitral valve.
- (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:

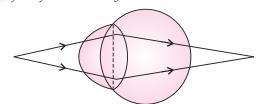
 [5]

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, Fertilization (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, G_1 -phase, G_2 -phase (cell cycle).
- **(v)** Renal vein, Renal artery, Afferent arteriole, Efferent arteriole, Glomerulus (pathway of blood through glomerulus).
- (f) Study the following diagram carefully and then answer the questions that follow. The diagram is depicting a defect of the human eye:

 [5]



- (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.
- (g) Match the items in Column A with that which is most appropriate in Column B. Rewrite the matching pairs: [5]

	Column A	Column B
(1)	Potometer	(a) Antiseptic
	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
υ,		(h) Thyroid gland
		(i) Alleles
		(j) Photosynthesis

(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
e.g. :	Cell wall, large vacuole, plastids, centrosome	Centro- some	Parts of plant cell
(i)	Cerebrum, cerebellum, thalamus, hypothala- mus		
(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		

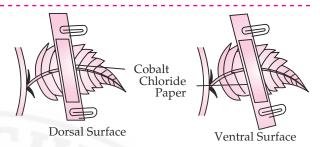
SECTION-II (40 Marks)

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: [5]

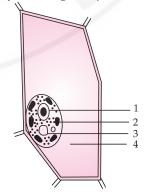
** Answer is not given due to change in the present syllabus.



- (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.
- **(b)** *Give the biological/technical terms for the following* : [5]
 - (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 substances into the body for developing resistance to a particular disease.**

Question 3.

(a) Given below is the diagram of a cell as seen under the microscope after having been placed in a solution: [5]

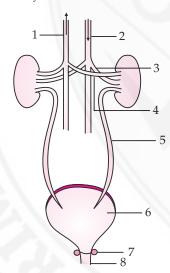


[5]

- (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?
- **(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)

Question 4.

The diagram below shows the excretory system of a human being. Study the same and then answer the *questions that follow:*



- *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.
- **(b)** *Briefly explain the following :*

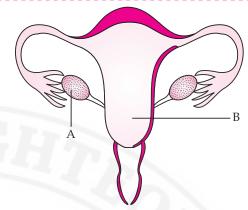
(ii) Allele

(i) Osmosis (iii) Pulse

- (iv) Reflex action
- (v) Synapse.

Question 5.

(a) Study the diagram given below and then answer the *questions that follow:* [5]

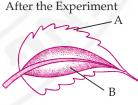


- (i) Name the part labelled A. Name any two hormones produced by the part labelled A.
- (ii) What happens to the part labelled B-
- **(1)** *If fertilization takes place?*
- **(2)** *If fertilization does not take place?*
- (iii) Where does fertilization occur?
- (iv) Draw a neat diagram of the human sperm as seen under high magnification and label the following parts.
- (1) Acrosome
- (2) Mitochondria
- **(b)** A homozygous plant having round (R) and yellow (Y) seed is crossed with homozygous plant having wrinkled (r) and green (y) seeds:
 - 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.

Question 6.

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

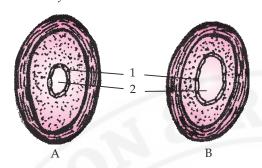
Green Portion White Portion



- 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 **Question 7.** two kinds of blood vessels: [5]



- (i) Identify the blood vessels A and B. In each case (b) give a reason to support your answer.
- (ii) Name the parts numbered 1 and 2.
- (iii) When are the sounds "LUBB" and "DUPP" 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.*

(a) Answer the following:

- (i) Draw a well labelled diagram of a 'Neuron' and name the following parts:
- (1) Node of Ranvier
- (2) Nissl 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.*
- (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.*

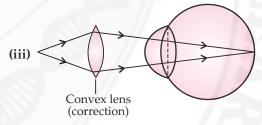
Answers

SECTION-I

Answer 1.

- (a) (i) Imbibition
- (ii) Atrial systole
- (iii) Liver
- (iv) Vasopressin or Antidiuretic Hormone (ADH)
- **(b) (ii)** (A)
- (iii) (A)
- (iv) (A)
- (v) (B)
- (c) (i) Chordae tendinae : Keeps the valves in position and prevents the backflow of blood in the atria.
 - (iii) Seminiferous tubule: Formation of sperms by spermatogenesis.
 - (iv) Thylakoids: Absorb sunlight for the (g) photosynthesis process to occur.
 - (v) Beta cells of pancreas: Produce insulin.
- (d) (i) Lenticels: Loose aggregration of cells in the bark of the stems and roots of certain plants for gaseous exchange.
 - (ii) Prostate gland: At the base of urinary bladder.
 - (iii) Thyroid gland: In the neck region at the base of larynx.
 - (iv) **Centrosome**: Situated close to the nucleus in Eukaryotic cell.
 - (v) Mitral valve or bicuspid valve: Present in the left atrio-ventricular aperture within the heart.
- (e) (ii) Ovulation, fertilization, implantation, gestation, parturition.
 - (iii) Auditory canal, tympanum, ear ossicles, oval window, cochlea.
 - (iv) G₁-phase, S-phase, G₂-phase, Karyokinesis, Cytokinesis.
- Answer is not given due to change in the present syllabus.

- (v) Renal artery, afferent arteriole, glomerulus, efferent arteriole, renal vein.
- (i) Far sightness or hypermetropia. **(f)**
 - (ii) 1. Lens is flattened or less convex.
 - Eyeball is short from front to back.



Column A	Column B
(1) Potometer	(g) Transpiration
(2) Hypothalamus	(e) Pituitary gland
(4) Contraception in males	(c) Vasectomy
(5) Mutation	(d) Sudden change in genes

Odd one	Category
(i) Cerebellum	Parts of forebrain
(ii) Ureter	Parts of female reproductive system
(iii) Liver	Endocrine glands
(iv) Pinna	Ear ossicles
(v) Night blindness	Sex-linked inheritance

SECTION-II

Answer 2.

- (a) (i) Transpiration
 - (ii) Transpiration is the loss of water in the form of vapours from the aerial parts of the plant.
 - (iii) To show that more transpiration occurs from the under surface of the leaf.
 - (iv) Cobalt chloride paper in the lower surface will turn pink faster because of presence of more stomata present on the under surface.
 - (v) 1. Sunken stomata, 2. Presence of thick cuticle, 3. Fewer stomata.
- **(b) (i)** Semi-permeable membrane
 - (ii) Recessive allele
 - (iii) Optic nerve
- (iv) Diapedesis
- (v) Meninges
- (vi) Presbyopia
- (vii) Tropic hormones
- (viii) Luteal phase
- (ix) Demography

Answer 3.

- (a) (i) Plasmolysed
 - (ii) Hypertonic solution
 - (iii) 1. Nucleus, 2. Chloroplast, 3. Vacuole, 4. Hypertonic solution.
 - (iv) Plant cell
 - **Reason : 1.** Presence of cell wall, **2.** Presence of large vacuole.
 - (v) It has to be placed in a hypotonic solution so, that water will enter the cell by endosmosis and the cell will regain its original shape.

(b) (i)

Natality	Mortality
Number of live births per 1000 individuals of a population per year.	Number of deaths per 1000 individuals of a population per year.

(ii)

Stoma	Stroma
Minute openings surrounded by guard cells present in the epidermal layers of the leaf.	Ground substance of chloroplast containing ribosome and DNA.

(iii)

Acromegaly	Cretinism
Elongation, enlargement of bones and jaws.	Poor physical and mental development, delayed growth, short hands and feet, dry skin.

(iv)

Transpiration	Guttation
Stomata, cuticles and lenticels.	Hydathodes, present on the leaf margin.

(v)

Diabetes Mellitus	Diabetes Insipidus
Insufficient secretion	Deficiency of
of insulin.	antidiuretic hormone.

Answer 4.

- (a) (i) 1. Posterior vena cava, 2. Aorta, 3. Renal artery, 4. Renal vein
 - (ii) 5. Ureter—Carries urine to the bladder from the kidney.
 - 6. Urinary bladder: Temporarily stores urine.
 - 7. Sphincter muscle: Controls the voiding of urine.
 - 8. Urethra: Release urine periodically.
 - (iii) Adrenal gland—At the top of each kidney.
- (b) (i) Osmosis: It is the diffusion of water molecules through a semi-permeable membrane from a region of higher concentration of water to a region of its low concentration.
 - (ii) Allele: It is one of the alternative form of the same gene responsible for determining contrasting characteristics.
 - (iii) Pulse: Rhythmic contraction of heart and elastic recoil of the wall of the artery during ventricular systole is called pulse.
 - **(iv) Reflex action :** Reflex action is the automatic, quick and involuntary action initiated by external stimulus at the level of spinal cord without the involvement of brain.
 - **(v) Synapse**: It is the point of contact between the axon ending of one neuron and dendrites of the other neuron for the transmission of impulse signal.

Answer 5.

- (a) (i) A is ovary. Hormones are oestrogen and progesterone.
 - (ii) (1) If the fertilization takes place, uterus gets prepared to receive the embryo. The uterine lining becomes thick. The blastocyst gets implanted in the endometrial linning and there is no menstrual discharge.
 - **(2)** If there is no fertilization, uterine lining is shed off with blood flow.
 - (iii) Fallopian tube.
 - (iv) Refer to ICSE Paper, 2018, Answer 3 (a) (v).
- (b) (i) Pisum sativum.
 - (ii) RrYy
 - (iii) 9:3:3:1—Yellow round (9), green round (3), yellow wrinkled (3), green wrinkled (1).
 - **(iv)** Law of independent assortment, which states that when there are two pairs of contrasting characters, the distribution of factors of each pair in the gametes is independent of the distribution of other pair of character.
 - (v) YR, Yr, yR, yr.

(a) (i) To show that chlorophyll is necessary for (a) (i) Refer to ICSE Paper, 2015, Answer 5 (b) (ii). photosynthesis.

(ii) Starch test, and the solution used is iodine (b) (i) solution.

(iii) Variegated leaf, example—croton

(iv) Green part (B) will turn blue-black, part (A) will turn brown

(v)
$$6CO_2 + 12 H_2O \xrightarrow{\text{Sunlight} \atop \text{Chlorophyll}} C_6H_{12}O_6 + 6O_2\uparrow + 6 H_2O$$

(b) (i) A—Artery, B—Vein, because in A lumen is narrow, in B lumen is wide.

(ii) 1 — Endothelium, 2 — Lumen.

(iii) "LUBB" sound is produced when ventricles contract and atrio-ventricular valves get closed at the beginning of ventricular systole.

"DUPP" sound is produced by the closure of semilunar valves at the beginning of ventricular diastole.

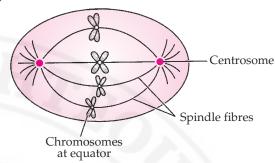
(iv) (1) Hepatic portal vein

(2) Coronary artery

Answer 7.

(ii) (1) Cerebrum

(2) Cerebellum



(ii) 1. Strong urge among people to have male children.

Children are considered to be helping hands to increase the family income.

(iii) (1) Because it controls the secretion of the hormones of other endocrine glands.

(2) Because after sexual reproduction, the diploid number of chromosome is maintained.

BIOLOGY

2011

QUESTIONS

[5]

SECTION-I (40 Marks)

Attempt all questions from this Section.

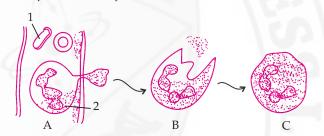
Question 1.

- (a) Name the following:
 - (i) The mineral element essential for the clotting of blood.
 - (ii) The cells of the testes that produce male hormones.
 - (iii) The nutritive layer of the eye which also prevents reflection of light.
 - (iv) The structural and functional unit of the kidney.
 - **(v)** The part of the chloroplast where the light reaction of photosynthesis takes place.
- (b) State the main function of the following: [5]
 - (i) Yellow spot
- (ii) Coronary artery
- (iii) Medulla oblongata (iv) Thrombocytes
- (v) Vitreous humour.
- (c) Copy and complete the following by filling in the blanks 1 to 5 with appropriate words/terms/phrases: [5]

 To test the leaf for starch, the leaf is boiled in water to......(1). It is next boiled in methylated spirit to......(2). The leaf is placed in warm water to soften it. It is then placed in a dish and.....(3) solution is added. The region, which contains, starch, turns......(4) and the region, which does not contain starch, turns......(5).
- (d) Give the exact location of: [5]
 - (i) Hydathodes
- (ii) Organ of corti
- (iii) Mitral valve
- (iv) Pituitary gland
- (v) Amnion
- (e) State whether the following statements are True or False. If False rewrite the correct form of the statement by changing the first or last word only:

 [5]
 - (i) Lysosomes is a part of the cell in which chromosomes are present.
 - (ii) Urethra carries urine from kidney to the urinary bladder.
 - (iii) Centromere is the organelle of the cell that initiates cell division.
 - **(iv)** Gestation is the process of fixing of the zygote to the uterine wall.
 - **(v)** Penicillin obtained from Pencillium notatum is an antibody.**
- (f) Rewrite and complete the following sentences by inserting the correct word in the space indicated: [5]
- ** Answer is not given due to change in the present syllabus.

- (i)vaccine is given to build up immunity against polio.**
- (ii) Phenotype is the observable characteristic which is.......controlled.
- (iii) Wooden doors swell up in rainy season due
- **(iv)** The blood vessel that begins and ends in capillaries is the.....
- **(v)** is the phenomenon of contraction of the cytoplasm from the cell wall.
- (g) Study the following diagram carefully and then answer the questions that follow: [5]



- (i) Name the cell labelled 1.
- (ii) Identify the phenomenon occurring in A.
- (iii) Mention two structural differences between 1 and 2.
- **(iv)** Name the process occurring in B and C and state the importance of this process in the human body.
- (h) Match the items in Column I with that which is most appropriate in Column II. [5]

	Column I		Column II
(1)	Pacemaker	(a)	Associated with static body balance
(2)	Stroma	(b)	Chordae tendinae
(3)	Afferent nerve	(c)	Site of light reaction
(4)	Prolactin	(d)	Motor neuron
(5)	Saccules	(e)	S A node
		(f)	Stimulates production of milk by the mammary gland
		(g)	Site of dark reaction
		(h)	Transmits impulses from receptor organ to spinal cord

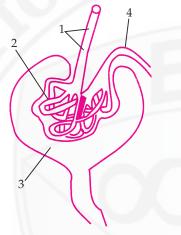
- (i) Secreted by anterior lobe of Pituitary gland
- (j) Transfers impulses from spinal cord to muscles.

SECTION-II (40 Marks)

Attempt any four questions from this Section.

Question 2.

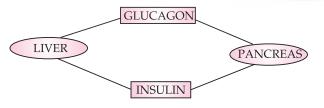
(a) Study the diagram given below and then answer the questions that follow: [5]



- (i) Name the region in the kidney where the above structure is present.
- (ii) Name the parts labelled 1, 2, 3 and 4.
- (iii) Name the stages involved in the formation of urine.
- **(iv)** What is the technical term given to the process occurring in 2 and 3? Briefly describe the process.
- **(b)** *Give reasons for the following :* [5
 - **(i)** Photosynthesis is considered as a process supporting all life on earth.
 - (ii) A matured mammalian erythrocyte lacks nucleus and mitochondria.
 - (iii) Potato cubes when placed in water become firm and increase in size.
 - (iv) Urine is slightly thicker in summer than in winter.
 - (v) People living in hilly regions usually suffer from simple goitre.

Question 3.

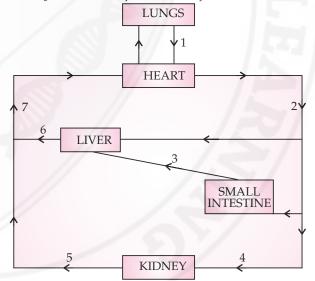
(a) Study the diagram given below and then answer the questions that follow: [5]



- (i) Name the cells of the pancreas that produce (1) glucagon, (2) insulin.
- (ii) State the main function of (1) glucagon, (2) insulin.
- **(iii)** Why is the pancreas referred to as an exoendocrine gland?
- **(iv)** Why is insulin not given orally but is injected into the body?
- **(v)** What is the technical term for the cells of the pancreas that produce endocrine hormones?
- (vi) Where in the body is the pancreas located?
- (b) With reference to the functioning of the eye, answer the questions that follow: [5]
 - **(i)** What is meant by power of accommodation of the eye?
 - (ii) What is the shape of the lens during (1) near vision, (2) distant vision?
 - (iii) Name the two structures in the eye responsible for bringing about the change in the shape of the lens.
 - (iv) Name the cells of the retina and their respective pigments which get activated (1) in the dark, (2) in light.

Question 4.

(a) The diagram below represents circulation in the human body. Answer the questions that follow: [5]

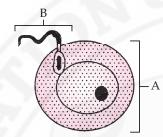


- (i) Name the blood vessels labelled 1, 3, 6 and 7.
- (ii) Name the blood vessel that supplies the walls of the heart with oxygen.
- (iii) Draw a neat labelled diagram of the blood vessel numbered '2' as seen in a cross section.
- **(iv)** *Mention one structural difference between blood vessels numbered* 4 *and* 5.
- (b) With reference to the human ear, answer the questions that follow: [5]
 - (i) Give the technical term for the structure found in the inner ear.

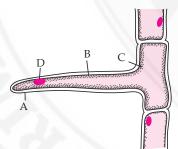
- (ii) Name the three small bones present in the middle ear. What is the biological term for them collectively?
- (iii) Name the part of the ear associated with (1) static balance, (2) hearing, (3) dynamic balance.
- (iv) Name the nerve, which transmits messages from the ear to the brain.

Ouestion 5.

(a) The diagram below represents two reproductive cells A and B. Study the same and then answer the questions that follow:



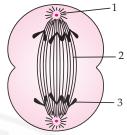
- (i) Identify the reproductive cells A and B.
- (ii) Name the specific part of the reproductive system where the above cells are produced.
- (iii) Where in the female reproductive system do these cells unite?
- (iv) Name the main hormones secreted by the (1) ovary, (2) testes.
- **(v)** Name an accessory gland found in the male reproductive system and state the function of its secretion.
- (b) The diagram below represents a layer of epidermal cells showing a fully-grown root hair. Study the diagram and answer the questions that follow: [5]



- (i) Name the parts labelled A, B, C and D.
- (ii) The root hair cell is in a turgid state. Name and explain the process that caused this state.
- **(iii)** *Mention one distinct difference between the parts labelled A and B.*
- **(iv)** Draw a diagram of the above root hair cell as it would appear when a concentrated solution of fertilizers is added near it.

Question 6.

- (a) The diagram below represents a stage during cell division. Study the same and then answer the questions that follow: [5]
- ** Answer is not given due to change in the present syllabus.



- (i) Name the parts labelled 1, 2 and 3.
- (ii) Identify the above stage and give a reason to support your answer.
- (iii) Mention where in the body this type of cell division occurs.
- (iv) Name the stage prior to this stage and draw a diagram to represent the same.
- (b) Study the diagram given below and answer the questions that follow: [5]



- (i) Name the process being studied in the above experiment.
- (ii) Explain the process mentioned in (i) above.
- (iii) Why is oil placed over water?
- (iv) What do we observe with regard to the level of water when this set up is placed in (1) bright sunlight,
- (2) humid conditions, (3) windy day?
- (v) Mention any three adaptations found in plants to overcome the process mentioned in (ii) above.

Question 7.

(a) (i) During a street fight between two individuals, mention the effects on the following organs by the autonomous nervous system, in the table given below: (one has been done for you as an example) [5]

Organ	Sympathetic system	Parasympathetic system
e.g. Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchioles
(1) Heart		
(2) Pupil of the eye		
(3) Salivary gland		

- (ii) List four major activities of the Red Cross.**
- b) Write down the difference between the following pairs as indicated within the brackets: [5]
 - (i) Antiseptic and disinfectant (an example for each).**

- (ii) Erythrocytes and leucocytes (function).
- (iii) Guttation and bleeding in plants (cause)
- (iv) NADP and AIDS (expand the abbreviation).
- **(v)** Monohybrid and Dihybrid cross (phenotypic ratio).

ANSWERS

SECTION-I

Answer 1.

- (a) (i) Calcium
 - (ii) Interstitial cells/Leydig cells
 - (iii) Choroid
 - (iv) Nephron/Uriniferous tubule
 - (v) Thylakoids
- **(b) (i)** It is the region of best, clearest and sharpest vision.
 - (ii) It carries oxygenated blood to the muscles of heart.
 - (iii) It controls involuntary functions of the body like heart beat, breathing etc.
 - (iv) Thrombocytes help in clotting of blood.
 - (v) It maintains the shape of eyeball.
- (c) (1) Kill the cells (2) Remove chlorophyll
 - (3) Iodine
- (4) Blue-black
- (5) Yellowish Brown
- (d) (i) At the tip and margins of leaves.
 - (ii) In the endolymph, present in the middle canal of cochlea.
 - (iii) Between the opening of left auricle and left ventricle.
 - (iv) At the base of brain.
 - (v) Around the embryo in the uterus.
- (e) (i) False. **Nucleus** is a part of the cell in which chromosomes are present.
 - (ii) False. Ureter carries urine from kidney to the urinary bladder.
 - (iii) False. **Centrosome** is the organelle of the cell that initiates cell division.
 - **(iv)** False. **Implantation** is the process of fixing of the zygote to the uterine wall.
- **(f) (ii)** Phenotype is the observable characteristic which is **genetically** controlled.
 - (iii) Wooden doors swell up in rainy season due to **imbibition**.
 - (iv) The blood vessel that begins and ends in capillaries is the **portal vein**.
 - **(v) Plasmolysis** is the phenomenon of contraction of the cytoplasm from the cell wall.
- (g) (i) 1-Red blood cell/Erythrocyte
 - (ii) Diapedisis

(iii)

	1	2
(a)	Non-nucleated.	Nucleated.
(b)	Round, disc shaped.	Amoeboid, irregular in shape.

(iv) Phagocytosis : By this process, the WBCs destroy the germs coming into the body.

(h)

(Column I		Column II
(1)	Pacemaker	(e)	SA node
(2)	Stroma	<i>(g)</i>	Site of dark reaction
(3)	Afferent	(h)	Transmists impulses
11	nerve		from receptor organ to
	7		spinal cord
(4)	Prolactin	(f)	Stimulates production
١.			of milk by the mammary
14			gland
(5)	Saccules	(a)	Associated with static
			body balance

SECTION-II

Answer 2.

- a) (i) Renal cortex
 - (ii) 1. Afferent arteriole
 - 2. Glomerulus
 - 3. Bowman's capsule
 - **4.** Efferent arteriole
 - (iii) Ultrafiltration, reabsorption and tubular secretion.
 - (iv) Ultrafiltration: In it, blood entering the glomerulus under great pressure is filtered. The reason for this greater pressure is that the efferent arteriole is narrower than the afferent arteriole. The liquid part of the blood filters through the walls of glomerular capillaries and Bowman's capsule and enters into the nephron where it is called the glomerular filtrate.
- (b) (i) This process produces food and releases oxygen, both of which are necessary to maintain life on earth.
 - (ii) Absence of nucleus gives the RBCs a biconcave shape which increases its surface area for absorption and transportation of oxygen. Lack of mitochondria ensures anaerobic respiration in them so that the oxygen they transport will not be used by them.

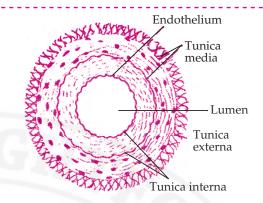
- (iii) Cells of potato are hypertonic and water enters into them due to endosmosis. This more water increases the size of the cells of the potato cubes. At this time due to turgor pressure and wall pressure, the potato becomes firm.
- (iv) In summer, water is lost from the body through sweating. To compensate for the loss, much water is reabsorbed by the kidney tubules and put back in blood and this makes the urine concentrated. In winter, all this water is lost from the body through urine only, that is why, is thinner.
- **(v)** In hilly regions, soil is deficient in iodine. People thus have deficiency of iodine in their diet. Deficiency of iodine causes thyroid gland to enlarge in effort to produce more hormone.

Answer 3.

- (a) (i) (1) Alpha cells of islet of Langerhans
 - (2) Beta cells of islet of Langerhans.
 - (ii) (1) In case of low blood sugar levels, glucagon stimulates the breakdown of glycogen into glucose in the liver and raises blood sugar level.
 - (2) Insulin controls high blood sugar level in the body. It promotes conversion of glucose to glycogen in the liver.
 - (iii) Pancreas produces pancreatic juice which is carried by pancreatic duct into the duodenum. It also produces hormones which are poured into blood. Because of this dual activity, it is called an exo-endocrine gland.
 - **(iv)** If insulin is given orally, it will be digested by the protein digesting enzymes in the stomach. Hence, it has to be injected.
 - (v) Islets of Langerhans.
 - (vi) Below the stomach.
- **(b) (i)** It is the ability of the body to focus clearly on objects, both close and distant from the eye.
 - (ii) (1) More convex or almost round
 - (2) Less convex or almost flat
 - (iii) Ciliary muscles and suspensory ligaments.
 - (iv) (1) Rods, rhodopsin
 - (2) Cones, iodopsin

Answer 4.

- (a) (i) 1. Pulmonary vein
 - 3. Hepatic portal vein
 - 6. Hepatic vein
 - 7. Inferior vena cava.
 - (ii) Coronary arteries
 - (iii) Top sectional view of Artery



(iv)

4 (Renal Artery)	5 (Renal Vein)
Wall thick and more	Wall thin and less
muscular.	muscular.

- (b) (i) Membranous labyrinth
 - (ii) Malleus, incus, stapes. Collectively called ear ossicles.
 - (iii) (1) Utriculus and sacculus
 - (2) Cochlea
 - (3) Semi-circular canals
 - (iv) Auditory nerve.

Answer 5.

- (a) (i) A–Ovum
- B-Sperm
- (ii) A is produced in ovary. B is produced in testes by the seminiferous tubules.
- (iii) Oviduct or Fallopian Tube
- (iv) (1) Progesterone and Oesterogen
 - (2) Testosterone
- (v) Seminal vesicles.

They produce secretion which activates the sperms and provide a medium for their transportation.

- (b) (i) A– Cell wall
- B- Cell membrane
- C-Cytoplasm
- D- Nucleus
- (ii) The process is called endosmosis and is defined as the movement of solvent (water) from outside to inside of the cell.

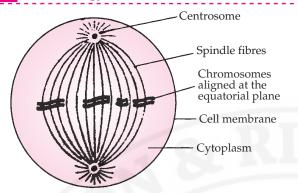
(iii)

A (Cell wall)	B (Cell membrane)
It is freely permeable.	It is semi-permeable.

(iv) Refer to ICSE Paper, 2016, Answer 2 (a) (v).

Answer 6.

- (a) (i) 1. Aster rays
- 2. Spindle fibre
- 3. Chromatid
- (ii) Anaphase—The two sister chromatids of each chromosome separate and move apart towards opposite poles.
- (iii) In the somatic cells of the body.
- (iv) Metaphase



- **(b) (i)** Absorption by roots and transpiration by leaves
 - (ii) It is the process by which plants lose water as vapours through the aerial parts.
 - (iii) To prevent direct evaporation of water from the test tube.
 - (iv) (1) In bright sunlight, the level of water decreases quickly.
 - (2) In humid conditions, level of water does not decrease for a long time.
 - (3) On windy day, level of water decreases very quickly.
 - (v) 1. The number of stomata may be reduced.
 - 2. Leaves may become narrow.
 - **3.** A thick layer of cuticle on the leaf surface helps to decrease transpiration.

Answer 7.

(a) (i)

(1)	Increases beat.	1	neart	Return heart beat to normal.
(2)	Dilates.			Constricts.
(3)	Secretion salivary decreases.		the land	Increases.

(b)

(ii)	Erythrocytes	Leucocytes
	Carry oxygen from lungs to all body tissues.	Defend the body from germs by destroying them.
(iii)	Guttation	Bleeding
3	Caused due to high hydrostatic pressure in the plant body and warm, humid condi- tions around it.	Due to some injury to plant.
(iv)	NADP	AIDS
	Nicotinamide Adenine Dinucleotide Phosphate	Acquired Immune Deficiency Syndrome.
(v)	Monohybrid	Dihybrid cross
_	3:1	9:3:3:1