X - ICSE BOARD - 2018

Date: 26.03.2018 Biology - Question Paper Solutions

SECTION - I (40 Marks)

Attempt all questions from this Section

Question 1

(a) Name the following :

(i) The organization 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.

Ans. (i) Red Cross

(ii) Hepatic artery

(iii) 46 (23 pairs)

(iv) Sclerotic layer (Sclera)

(v) Cuticle

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

(i) The number of Spinal nerves in a human being are :

(A) 31 pairs (B) 10 pairs (C) 21 pairs (D) 30 pairs

Ans. (A) 31 pairs

(ii) Which one of the following is non-biodegradable?

(A) DDT (B) Vegetable peel (C) Cardboard (D) Bark of trees

Ans. (A) DDT

(iii) Aqueous humour is present between the :

(A) Lens and Retina (B) Iris and Lens

(C) Cornea and Iris (D) Cornea and Lens

Ans. (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

Ans. (A) Cresol

(v) Which one of the following is a Greenhouse gas?

(A) Oxygen (B) Methane (C) Sulphur dioxide (D) Nitrogen

Ans. (B) Methane

(c) Complete the following paragraph by filling in the blank (i) to (v) with appropriate words:

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 while does not contain starch, turns (v) _____.

Ans. (i) to kill the cells.

(ii) remove the chlorophyll

(iii) Iodine solution

(iv) blue-black in colour

(v) brown

(d) Match the items given in Column A with the most appropriate ones in Column B and rewrite the correct matching pairs.

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
	(g) Hypersecretion of Thyroxine

Ans. (i) Cretinism : Hyposecretion of Thyroxine

(ii) Diabetes insipidus : Hyposecretion of Vasopressin

(iii) Exophthalmic Goitre : Hypersecretion of Thyroxine

(iv) Adrenal virilism : Hypersecretion of adrenal cortex

(v) Dwarfism : Hyposecretion of growth hormone

(e) Correct the following statements by changing the underlined words:

(i) Normal pale yellow colour of the urine is due to the presence of the pigment *Melanin*.

(ii) The outermost layer of Meninges is *Pia mater*.

(iii) The cell sap of root hair is *Hypotonic*.

(iv) *Xylem* transports starch from the leaves to all parts of the plant body.

(v) *Nitrogen* bonds are present between the complementary nitrogenous bases of DNA.

Ans. (i) Urochrome

(ii) Dura mater

(iii) Hypertonic

(iv) Phloem

(v) Hydrogen bonds

(f) Choose between the two options to answer the question specified in the brackets for the following:

An example is illustrated below.

Example: Corolla or Calyx (Which is the miter 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 ?)

Ans. (i) Renal artery

(ii) Endolymph

(iii) Lenticels

(iv) Choroid layer

(v) Pulmonary artery

(g) Given below is a representation of a type 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'.

Ans. (i) Air pollution

(ii) Smoke from vehicles

(iii) Air pollution results in respiratory problems, lung disorders etc.

(iv) (A) Use of unleaded petrol and of CNG.

(B) Switching off automobile engines at red lights and when not in use.

(v) CFC's (chlorofluorocarbons) released from refrigerators, aerosol-sprayers etc.

(h) Choose the ODD one out from the following terms given and name the CATEGORY to which the others belong :

(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.

Ans. (i) X-rays (Chemical pollutants)

(ii) Lumen (All others are connective tissues)

(iii) Spinal cord (Parts of nerve cell)

(iv) Centrosome (Organelles in Plant cell)

(v) Seminiferous tubules (Others are Accessory glands in male reproductive system)

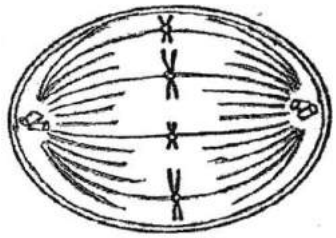
SECTION - II (40 Marks)

Attempt any four questions from this Section

Question 2

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

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.

Ans. (i) Animals cell. Because it lacks cell-wall.

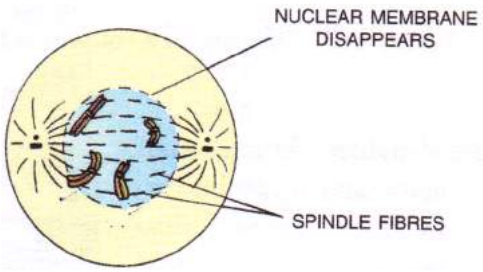
(ii) Metaphase. Chromosomes lined up in one plane at equator.

(iii) 1. Mitotic cell division

2. Meiosis (Reductional) cell division

(iv) Prophase comes before metaphase.

(v)



Prophase

(b) Mention the exact location of the following :

(i) Epididymis

(ii) Lacrimal gland

(iii) Malleus

(iv) Hydathodes

(v) Pulmonary semilunar valve

Ans. (i) Male reproductive system

(ii) Eyes

(iii) Middle ear

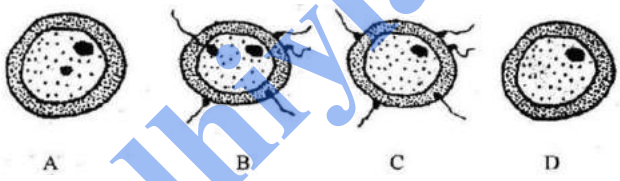
(iv) Leaf of plants

(v) At the opening of pulmonary trunk in right ventricle

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.

Study the diagrams and answer the questions:



(i) Arrange the letters given below each digram 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.

Ans. (i) D-C-B-A

(ii) Ampullary - Isthmic junction in fallopian tubes

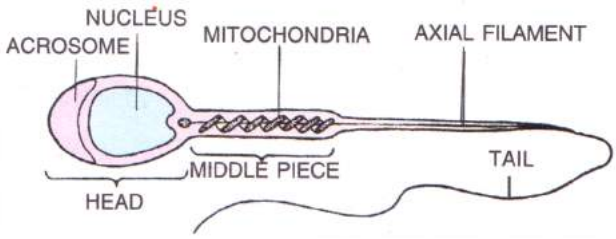
Implantation is a attachment of the developing foetus (blastocyst) to endometrium

(iii) Egg is haploid (23)

Zygote is diploid (46)

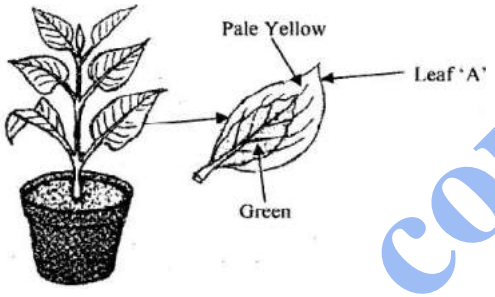
(iv) The intrauterine period of foetus in mother's body or the period from zygote to fully formed foetus in uterus period is gestation period. It is about 280 days (9 months + 7 days approximately)

(v)



Human Sperms

(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.



(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 I eaf 'A' shown in the diagram ? Give an example of a plant with variegated leaves.

(v) Draw a neat labelled diagram of a chloroplast.

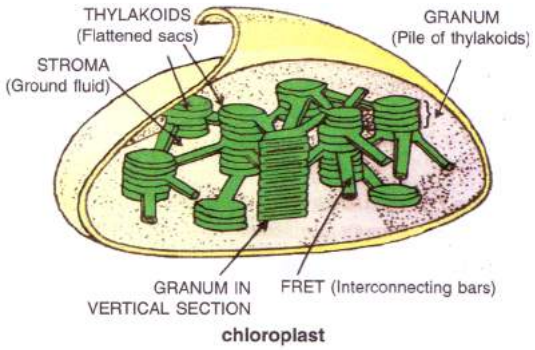
Ans. (i) To show that chlorophyll is necessary for photosynthesis.

(ii) $6CO_2 + 12H_2O \xrightarrow[Chlorophyll]{Light} C_6H_{12}O_6 + 6O_2 \uparrow + 6H_2O$

(iii) To destarch the leaves.

(iv) It will not turn blue. Example of plants with veriegated leaves is Oxalis species.

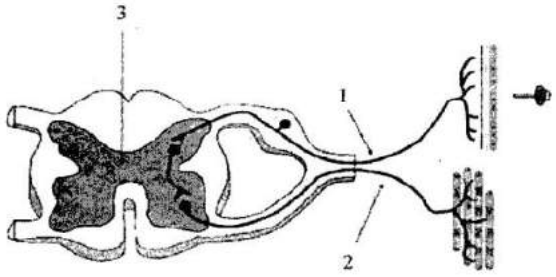
(v)



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:



(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.

Ans. (i) Reflex action

Definition - A quick, automatic, involuntary and often unconsicous action brought about when the receptors are stimulated by external or internal stimuli.

(ii) Synaptic - Junction

(iii) 1 = Sensory neuron

2 = Motor neuron

3 = Grey matter with central canal of spinal cord

(iv) The grey matter is present in the cortex (outer side) consisting of cell bodies and white matter is present inside, which consists of myelinated axons in the brain.

In spinal cord, the grey matter (cell bodies) are present inside, while white matter (Myelinated axon) is present outside.

(v) Vertebral column, meninges and cerebrospinal fluid (CSF)

(b) Give appropriate biological or technical terms for the following :

(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 he birth rate and the death rate.

Ans. (i) Osmoregulation

(ii) Trophic hormones

(Secreted by hypothalamus and pituitary)

(iii) Diffusion

(iv) Homozygous

(v) Nucleosomes

(vi) Menarche

(v) Diapedesis

(vi) Amniotic fluid

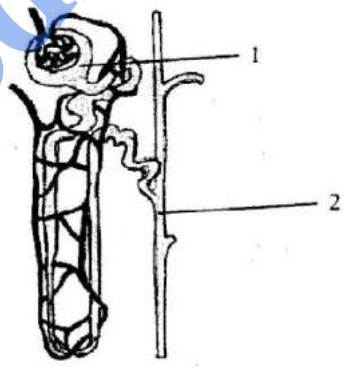
(vii) Diastole

(viii) Growth rate

Question 5

(a) The diagram given below is that of a structure present in a human kidney.

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*.

Ans.(i)Nephron

(ii) (1) Glomerular filterate

(2) Glucose and Amino acids

(iii) (1) Urine

(2) Urea

(iv) The 3 steps are

(1) Ultrafiltration

(2) Selective Reabsorption

(3) Tubular secretion

(v) Glucose

(b) Differentiate between the following pairs on the basis of what is indicated in the brackets.

(i) Leaf and Liver [form in which glucose is stored]

(ii) ATP and AIDS [expand the abbreviations]

(iii) Testosterone and Oestrogen [organ which secrets]

(iv) Ureter and Urethra [function]

(v) Hypotonic solution and Hypertonic solution [condition of a plant cell when placed in them]

Ans. (i) Leaf - Starch

Liver - Glycogen

(ii) ATP – Adenosine triphosphate

AIDS – Acquired Immunodeficiency Syndrome

(iii) Testosterone – Testis

Oestrogen – Ovaries

(iv) Ureter – Tranport of urine from kidneys to urinary bladder.

Urethra – Transport of urine from urinary bladder to outside.

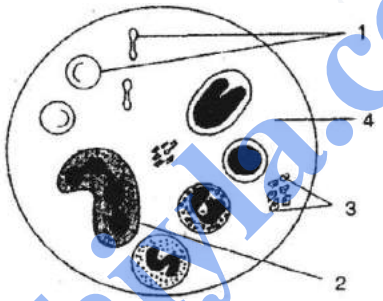
(v) Hypotonic solution – Turgid

Hypertonic solution – Flaccid

Question 6

(a) Given below is a diagram of a human blood smear.

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.

Ans. (i) 1. RBC

2. Neutrophil

3. Blood platelets

4. Blood plasma

(ii) **RBC**

- Biconcave, disc shaped
- Do not have nucleas

Neutrophil

- Amoeboid
- Have 3-5 lobbed nucleas.

(iii) Fibrinogen

(iv) 120 days

(v) RBCs do not have nucleas, endoplasmic reticulum and mitochondria. They are very efficient in carrying nutrients like glucose (which they cannot use, due to lack of mitochondria), can easily pass through the capillaries (lack of endoplasmic reticulum - endoskeleton)

(b) Give biological explanations for the following:

(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.

Ans. (i) The married couples should be educated to delay birth of their first child, to space the second with a sufficient interval for proper up bringing and to stop the third.

(ii) The placenta allows diffusion of food and oxygen from mother to foetus and that of nitrogenous waste and CO_2 from foetus to mother.

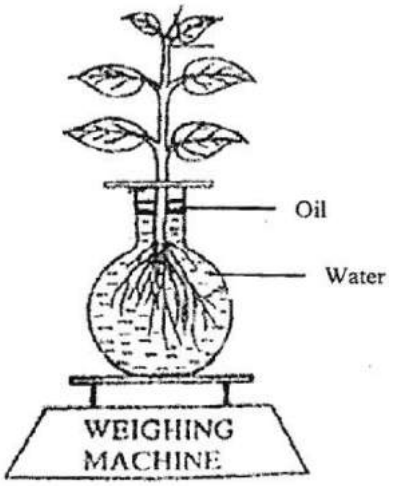
(iii) Green plants are the only organisms that are able to synthesize food from CO_2 and H_2O in presence of chlorophyll and sunlight. However, animals depend upon plants for food. Therefore, all food chains begin with green plants.

(iv) Plants growing in fertilized soil are often formed to wilt, if the soil is not adequately watered because of flaccidity or a decrease in turgor pressure exerted by the absorbed water on the cell wall of plants.

(v) We should not put sharp objects into out ears, as it may damage the ear drum.

Question 7

(a) The diagram below represents a process in plants. 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 temm 'Guttation'.

Ans. (i) 1. Transpiration

2. Oil was added to the water to prevent its evaporative loss.

(ii) Upon exposure to bright sunlight for four hours; the final weight will be lesser than the initial weight; because some water will be lost from the aerial parts of the plant by transpiration.

(iii) 1. No change in the level of water

2. The level of water drops.

(iv) The three adaptations found in plants to overcome transpiration are:

1. Sunken stomata: The stomata may be sunken or covered by hairs (eg. *Nerium*)
2. Narrow leaves: The leaves may become narrower to reduce surface area.
3. Fewer stomata: The number of stomata may be reduced.

(v) The leaves of certain plants exhibit droplets of water along their margins in the morning. This particularly happens in plants growing in warm humid conditions. A humid environment hampers transpiration while the roots continue to absorb water from the soil. This builds up a high hydrostatic pressure within the plant and "forces out" the excess water directly from the tips of veins in the leaf by a process called 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 F1 generation.

Which type of pollination has occurred to produce F1 generation?

(ii) Write the phenotypic ratio of the F2 generation.

(iii) Write the possible combinations of the gametes that can be obtained if two F1 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?

Ans. (i) (1) Phenotype of F1 generation: Pea plants with green and inflated pods.

(2) Genotype of F1 generation: GgIi

(3) Artificial cross pollination has occured to produce the F_1 generation.

(ii) The phenotypic ratio of the F_2 generation is 9 : 3 : 3 : 1.

(iii) The possible combination of gametes that can be obtained if two F1 hybrid plants are crossed are as follows:

GI, Gi, gI, gi.

(iv) The two members of a pair of factors separate during the formation of gametes. This is the Mendel's law of 'Segregation of Gametes'.

(v) *Pisum sativum*