ICSE Board
Class X Biology
Board Paper 2012 - Solution

SECTION I

Answer 1

(a)

(i) (B) Tuberculosis. BCG vaccine provides immunity or protection against tuberculosis (TB). The vaccine may be given to persons at a high risk of developing TB.

(ii) (A) Retina. The retina consists of two types of photoreceptor cells—rods and cones. Rods function mainly in dim light and provide black and white vision, while cones support daytime vision and perception of colour.

(iii) (A) Remove starch from the plant. During destarching, all starch from the leaves gets removed and the leaves do not show the presence of starch.

(iv) (B) Nicotinamide Adenine Dinucleotide Phosphate. NADP is a cofactor used in anabolic reactions.

(v) (A) Receptor cell, sensory neuron, relaying neuron, effector muscles. A reflex arc is a neural pathway which controls a reflex action.

[Please note that the explanation provided is to help you in learning. You may not be required to write an explanation in your answer to this question.]

(b)

(i) Antibiotics

(ii) Antidiuretic hormone (ADH)

(iii) Atrial systole or auricular systole

(iv) Liver

(v) Imbibition

(c)

(i) Lenticels: Openings on the older stems, roots and other parts of vascular plants.

(ii) Prostate gland: Surrounds the urethra close to its origin from the urinary bladder.

(iii) Thyroid gland: Situated in front of the neck just below the larynx.

(iv) Centrosome: Located near the nucleus.

(v) Mitral valve: Located between the left atrium and the left ventricle.

(d)

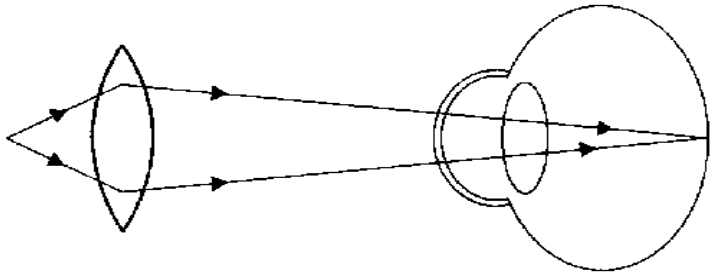
(i) Hyperopia or hypermetropia

(ii) Possible reasons for the defect:

(a) Shortening of the eyeball from front to back.

(b) The lens becomes too flat.

(iii) Rectification of hyperopia:



(e)

(i) Chordae tendineae: Hold the valves in position, preventing their upturning, due to pressure exerted by the contracting ventricles.

(ii) Lymphocytes: Produce antibodies.

(iii) Seminiferous tubules: Produce sperms by the process of spermatogenesis.

(iv) Thylakoids: The pigment chlorophyll, contained in the walls of thylakoids, traps sunlight as photons which are required for photosynthesis.

(v) Beta cells of pancreas: Secrete the hormone insulin.

(f)

(i) Bacteria, Antigen, Active immunity, Lymphocytes, Antibody

(ii) Ovulation, Fertilisation, Implantation, Gestation, Parturition

(iii) Auditory canal, Tympanum, Ear ossicles, Oval window, Cochlea

(iv) G_1 phase, S phase, G_2 phase, Karyokinesis, Cytokinesis

(v) Renal artery, Afferent arteriole, Glomerulus, Efferent arteriole, Renal vein

(g)

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

(h)

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

SECTION II

Answer 2

(a)

(i) Semi-permeable membrane
(ii) Recessive allele
(iii) Optic nerve
(iv) Diapedesis
(v) Meninges
(vi) Presbyopia
(vii) Tropic hormones
(viii) Luteal phase
(ix) Demography
(x) Vaccination

(b)

(i) Transpiration.
(ii) Transpiration is a process by which plants lose water, in the form of water vapour, from their internal tissues through the aerial parts of the plant. Transpiration helps plants to maintain their body temperature. It also cools the regions around the plants.
(iii) The aim of the experiment is to demonstrate that more transpiration occurs from the lower surface of the leaf.
(iv) After an hour, both the cobalt chloride papers attached to the upper as well as the lower surface of the leaf turn pink. However, the pink colour of the paper attached to the lower surface is darker as compared to the paper attached to the upper surface of the leaf. This is because the number of stomata on the lower surface is more than the number of stomata on the upper surface of the leaf.
(v) Adaptations in plants to overcome the process of transpiration:
a. Presence of a thick cuticle.
b. Reduced exposed surfaces as the leaves get wavy, rolled or folded.
c. Leaves may be shed or modified into spines, as in cactus.

Answer 3

(a)

(i) Difference between natality and mortality on the basis of definition.

Natality	Mortality
Natality is the number of live births per 1000 people of the population per year.	Mortality is the number of deaths per 1000 people of the population per year.

(ii) Difference between stoma and stroma on the basis of structure.

Stoma	Stroma
Stoma is a pore present in the epidermal layers of leaves. It is guarded by two bean-shaped guard cells on either side.	Stroma is the colourless ground substance present in the chloroplasts.

(iii) Difference between acromegaly and cretinism on the basis of symptoms.

Acromegaly	Cretinism
Acromegaly is caused by oversecretion of the growth hormone. Extra growth of bones in the face, hands and feet occurs.	Cretinism is caused by the deficiency of thyroxine. It affects the growth of children showing dwarfism and mental retardation.

(iv) Difference between transpiration and guttation on the basis of structures involved.

Transpiration	Guttation
In transpiration, the loss of water occurs through stomata, cuticle and lenticels.	During guttation, water escapes from the hydathodes present on the leaf margins.

(v) Difference between diabetes mellitus and diabetes insipidus on the basis of cause.

Diabetes mellitus	Diabetes insipidus
Diabetes mellitus is caused by insufficient secretion of insulin.	Diabetes insipidus is caused by the deficiency of antidiuretic hormone.

(b)

(i) The cell is said to be plasmolysed.

(ii) Hypertonic solution.

(iii) 1: Nucleus
2: Plastid
3: Vacuole
4: Empty space between the cell wall and the protoplasm of the cell.

(iv) It is a plant cell. It shows the presence of cell wall and plastids.

(v) The cell has to be placed in a hypotonic solution, so that water will enter the cell by endosmosis and the cell will regain its original condition or shape.

Answer 4

(a)

(i) **Osmosis:** Osmosis is the movement of water molecules across a semipermeable membrane from a region of their higher concentration to a region of their lower concentration.

(ii) **Allele:** The alternative forms of a gene occupying the same position on homologous chromosomes and affecting the same characteristic but in two alternative ways are called alleles. For example, T and t are the alleles for height. T is for tallness and t is for dwarfness.

(iii) **Pulse:** Pulse is the alternate expansion and elastic recoil of the walls of the artery during ventricular systole.

(iv) **Reflex action:** Reflex action is an automatic, quick and involuntary action in the body brought about by a stimulus.

(v) **Synapse**: Synapse is a point of contact between the terminal branches of the axon of a neuron with the dendrites of another neuron separated by a fine gap.

(b)

(i) 1 – Posterior vena cava
2 – Aorta
3 – Renal artery
4 – Renal vein

(ii) 5 (Ureters): Transport urine from the kidneys to the urinary bladder.
6 (Urinary bladder): Temporarily stores urine.
7 (Sphincter): Guards the opening of the urinary bladder into the urethra and relaxes only at the time of urination (micturition).
8 (Urethra): Helps to release the urine from the urinary bladder out of the body.

(iii) Adrenal glands. They are placed on the top of each kidney like a cap.

Answer 5

(a)

(i) Mendel conducted his hybridisation experiments on the pea plant *Pisum sativum*.

(ii) The genotype of F_1 generation is RrYy, i.e. heterozygous pea plant with round and yellow seeds.

(iii) Dihybrid phenotypic ratio in F_2 generation is 9:3:3:1.

Phenotype of the offspring of F_2 generation:

(a) Round and yellow seeds

(b) Round and green seeds

(c) Wrinkled and yellow seeds

(d) Wrinkled and green seeds

(iv) The law of independent assortment explains the dihybrid ratio. It states that when there are two pairs of contrasting characters, the distribution of the members of one pair into the gametes is independent of the distribution of the other pair.

(v) Gametes obtained from F_1 hybrid are YR, yR, Yr, yr.

(b)

(i) Part A is the ovary. Two hormones produced by the ovary are oestrogen and progesterone.

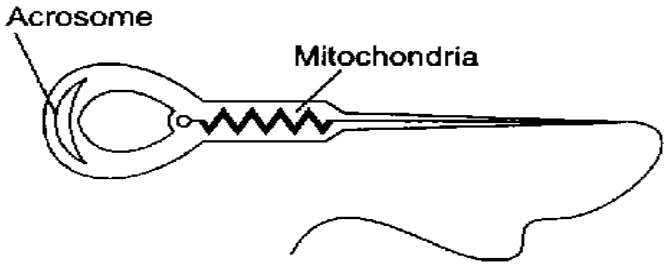
(ii)

(1) If fertilisation takes place, then the zygote gets implanted in the endometrial walls of the uterus and there is no menstrual discharge.

(2) If fertilisation does not take place, then the egg disintegrates and the uterine lining starts shedding on the 28^{th} day of the menstrual cycle.

(iii) Fertilisation occurs in the oviduct.

(iv) **Human sperm**



Answer 6

(a)

(i) Blood vessel A is an artery as the lumen of this blood vessel is narrow with thick muscular walls.

Blood vessel B is a vein as the lumen of this blood vessel is wide with thin muscular walls.

The lumen is narrow in an artery but is wider in a vein. In a vein, the middle layer is not as thick as that of the artery.

(ii)

Part 1 – Endothelium

Part 2 – Lumen

(iii) The 'LUBB' sound is produced when the tricuspid and bicuspid valves close with a jerk. The 'DUB' sound is produced when the semilunar valves at the roots of aorta and pulmonary artery get closed.

(iv)

(i) Portal vein

(ii) Coronary artery

(b)

(i) The aim of the experiment is to demonstrate that chlorophyll is necessary for photosynthesis.

(ii) The test performed on the leaf is the starch test. Iodine solution is used for the test.

(iii) A variegated leaf, i.e. a leaf which contains green and non-green parts, was used for the experiment, e.g. *Coleus*.

(iv) Part A does not turn blue black as it lacks chloroplasts and cannot synthesise starch. Part B turns blue black as it possesses chloroplasts and so undergoes photosynthesis, thereby producing starch.

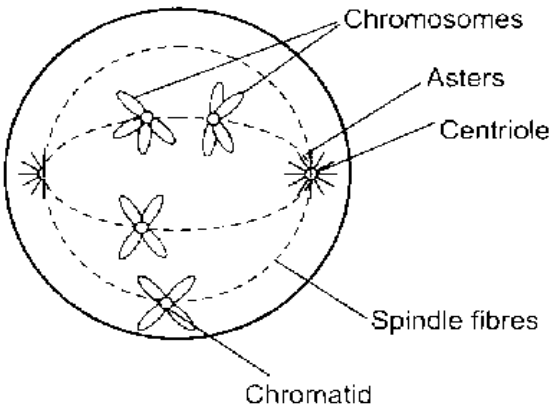
(v) Chemical equation for the process of photosynthesis:

$$6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{light energy}} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$$

Answer 7

(a)

(i) Metaphase in an animal cell:



(ii) Reasons for the population explosion in India:

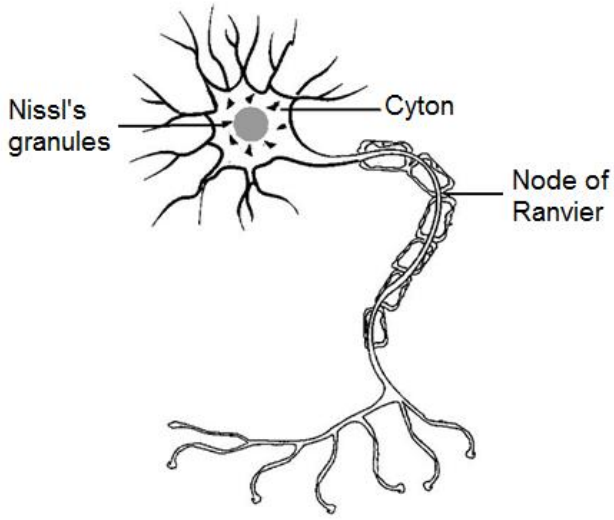
1. Illiteracy: Most of the people in rural areas are illiterate, ignorant and superstitious. They do not know about the functioning of the human reproductive system.
2. Traditional beliefs: Among the people from the lower strata of society, children are regarded as a gift of God and a sign of prosperity.

(iii)

1. The pituitary gland controls the secretion of all the other endocrine glands. Therefore, the pituitary gland is also known as the master gland.
2. Gametes are formed due to meiosis. Meiosis is the reduction division during which daughter cells receive half the number of chromosomes as that of the parent cells. Therefore, gametes have a haploid number of chromosomes.

(b)

(i) Neuron



(ii) (1) Seat of memory: Cerebrum

(2) Coordinates muscular activity: Cerebellum

(iii) Major activities of WHO:

(1) To collect and supply information about the occurrence of diseases of epidemic nature such as cholera, plague etc.

(2) To promote and support projects for research on diseases.

(3) To supply information on the latest developments about the use of vaccines.