

ICSE Board
Class X Biology
Board Paper 2015 (Solution)

SECTION I

Answer 1

(a)

- (i) Active transport
- (ii) Glycogen
- (iii) Pulmonary vein
- (iv) Monohybrid cross
- (v) Placenta

(b)

- (i) Alpha cells of pancreas secrete **glucagon**.
- (ii) Formalin is an example of a **disinfectant**.
- (iii) **Sulphur dioxide** is mainly responsible for the formation of acid rain.
- (iv) Sulphadiazine is an example of a **sulphonamide (sulpha drug)**.
- (v) Cretinism is caused due to deficiency of **thyroxine**.

(c)

- (i) A. Epididymis
(The epididymis is a single, highly coiled tube about 6 metres long which stores sperms for some days during which they mature and become motile.)
- (ii) A. Metaphase
(During metaphase, each chromosome gets attached to the spindle by its centromere. The chromosomes line up in the centre at the equatorial plane.)
- (iii) C. Tuberculosis
(BCG is a freeze-dried vaccine effective against tuberculosis.)
- (iv) B. Cerebellum
(Cerebellum, a part of the hindbrain, is responsible for maintaining posture, balance and equilibrium of the body.)
- (v) D. DDT
(DDT [Dichlorodiphenyltrichloroethane] is a non-biodegradable pollutant which persists in nature and tends to accumulate in the food chain.)

Please note that the information provided in brackets is to help you in your learning. It does not have to be included in your answer.

(d)

- (i) Thylakoids: Located in the inner membrane of the chloroplast.
- (ii) Organ of Corti: Present in the middle canal of the inner ear or membranous labyrinth.
- (iii) Lenticels: Present on the older stems of plants in place of stomata.
- (iv) Bicuspid valve: Located at the aperture between the left auricle and the left ventricle.
- (v) Loop of Henle: Runs in the medulla of the kidneys and connects the proximal convoluted tubule and the distal convoluted tubule.

(e)

- (i) Anaphase
- (ii) A - Spindle fibre
B - Centromere
- (iii) During this stage (anaphase), the two sister chromatids of each chromosome separate and are drawn towards the opposite poles because of shortening of spindle fibres.
- (iv) This type of cell division (mitosis) results in the formation of two daughter cells.

(f)

- (i) Xylem and **Absorption and conduction of water.**
- (ii) Ciliary body and **Alteration of the shape of the eye lens.**
- (iii) Seminiferous tubule and **Spermatogenesis.**
- (iv) Thyroid gland and **Secretion of thyroxine and calcitonin.**
- (v) Eustachian tube and **Equalising air pressure.**

(g)

- (i) The phenomenon of loss of water through a cut stem or injured part of plant is called **bleeding.**
- (ii) **Pisum sativum** 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 **vitreous humour.**
- (iv) Oxygen combines with haemoglobin present in RBC and forms **oxyhaemoglobin.**
- (v) **Acid rain** causes corrosion of the marble or brick surface.

(h)

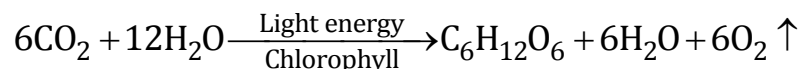
- (1) Allele – Alternate forms of genes
- (2) Leydig cells – Testosterone
- (3) Utriculus – Dynamic equilibrium
- (4) Snake bite – Tourniquet
- (5) Euro IV norms – Control of automobile exhaust

SECTION II

Answer 2

(a)

- (i) Photosynthesis releases the bubbles of oxygen.
- (ii) Photosynthesis is a physiological process by which plant cells containing chlorophyll produce food in the form of carbohydrates by using carbon dioxide, water and light energy. Oxygen is released as a by-product.
- (iii) Carbon dioxide released by the snail during respiration is used by the plant for photosynthesis. This increases the rate of photosynthesis in the plant placed in test tube B. This also suggests that both respiration and photosynthesis are complementary processes to maintain the concentration of oxygen and carbon dioxide in the atmosphere.
- (iv) In test tube B, a plant and a snail are kept. The plant in test tube B has more concentration of CO₂ available because the snail releases CO₂ during respiration. This increases the rate of photosynthesis in the plant placed in test tube B which leads to the release of more amount of oxygen.
- (v) *Hydrilla*
- (vi) Chemical equation for photosynthesis:



(b)

- (i) A mixture of smoke and fog – **Smog**
- (ii) Capacity of our body to resist disease – **Immunity**
- (iii) Fixing of developing zygote on the uterine wall – **Implantation**
- (iv) The permanent stoppage of menstruation at about the age of 45 years in a female – **Menopause**
- (v) The hormone increasing reabsorption of water by kidney tubules – **Anti-diuretic hormone (Vasopressin)**
- (vi) A thin membrane covering the entire front part of the eye – **Conjunctiva**
- (vii) The lens of eye losing flexibility resulting in kind of long-sightedness in middle aged people – **Presbyopia**
- (viii) The number of persons living per square kilometre at any given time – **Population density**
- (ix) The sound produced when atrioventricular valves close in the heart – **Lubb sound**
- (x) The process by which white blood cells engulf bacteria – **Phagocytosis**

Answer 3**(a)**

- (i) Transpiration
- (ii) Transpiration is a process during which water is lost in the form of water vapour through the aerial parts of the plant.
- (iii) The pot is covered with a plastic sheet to prevent the evaporation of water from the soil.
- (iv) A control for this experiment will be an empty polythene bag with its mouth tied.
- (v) Transpiration is beneficial to plants in the following ways:
 - It creates a suction force in the stem which enables the roots to absorb water and minerals.
 - It helps in cooling the plant in hot weather.
- (vi) Adaptations in plants to reduce transpiration are
 - Leaves may be modified into spines as in cactus or into needles as in pines.
 - The number of stomata is reduced and they may be sunken in pits.
 - Leaves may be folded or rolled up.

(b)

- (i) Reasons for the increase of population in India:
 - Most Indian families desire to have at least one son. Hence, a couple produces several children till a son is born.
 - Most of the rural population is still illiterate, ignorant and superstitious. Therefore, they do not make any effort to avoid pregnancy.
- (ii) Significance of amniotic fluid:
 - It protects the embryo from physical damage by jerks and mechanical shocks.
 - It also maintains even pressure all around the embryo.
- (iii) Function of ear ossicles:
 - Ear ossicles once set in vibrations transmit the vibration to the oval window which sets the cochlear fluid into vibration.
- (iv) Activities of WHO:
 - Collecting and supplying information about the occurrence of diseases of an epidemic nature.
 - Supplying information on the latest developments about the use of vaccines, cancer research, nutritional discoveries, control of drug addiction and the health hazards of nuclear radiation.
- (v) Mendel's law of dominance:

Out of a pair of contrasting characters present together, only one is able to express itself, while the other remains suppressed.

Answer 4

(a)

- (i) A – Artery
B – Vein
C – Blood capillary
- (ii) 1 – External layer of connective tissue
2 – Lumen
3 – Middle layer of smooth muscles and elastic fibres
- (iii) Oxygenated blood flow through A
- (iv) Structure difference between A (artery) and B (vein):

A (Artery)	B (Vein)
Valves are not present.	Valves are present.

- (v) In blood capillaries, the exchange of gases takes place.

(b)

(i) **Diffusion and Osmosis (Definition):**

Diffusion	Osmosis
Diffusion is the free movement of molecules of a substance from the region of its higher concentration to the region of its lower concentration when the two substances are in direct contact.	Osmosis is the diffusion of water molecules across a semi-permeable membrane from a more dilute solution (with a lower solute concentration) to a less dilute solution (with a higher solute concentration).

(ii) **RBC and WBC (Shape):**

RBC	WBC
RBCs are disc-like, flat at the centre and round at the periphery.	WBCs are amoeboid or irregular in shape.

(iii) **Tubectomy and Vasectomy (Part cut and tied):**

Tubectomy	Vasectomy
Fallopian tubes are cut and ligated.	Vas deferentia are cut and ligated.

(iv) **Vasopressin and Insulin (Deficiency disorder):**

Vasopressin	Insulin
Insufficient secretion of vasopressin causes diabetes insipidus.	Insufficient secretion of insulin causes diabetes mellitus.

(v) **Rods and Cones of Retina (Type of pigment):**

Rods	Cones
Rods produce rhodopsin.	Cones produce iodopsin.

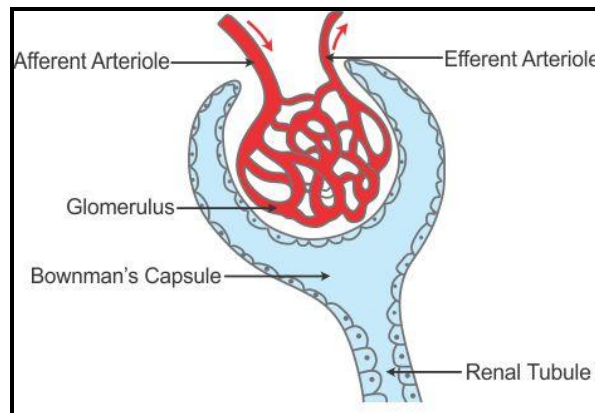
Answer 5

(a)

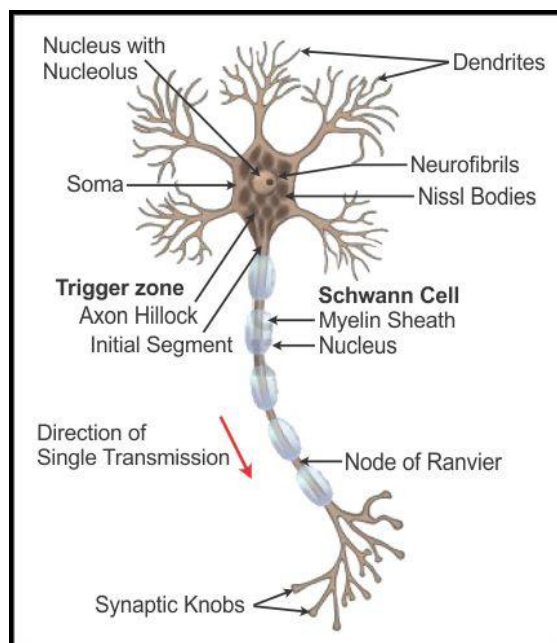
- (i) 1 – Cortex
2 – Medulla
3 – Pelvis
4 – Ureter
- (ii) Medulla is composed of a striped substance arranged in several pyramids. Hence, the medulla (2) has a striped appearance.
- (iii) Urine passes down part '4', i.e. ureter. The main nitrogenous substance present in it is urea.
- (iv) Nephrons are the structural and functional units of the kidneys.
- (v) The two major steps in the formation of urine are ultrafiltration and selective reabsorption.

(b)

- (i) Malpighian capsule



- (ii) A myelinated neuron



Answer 6

(a)

- (i) 1 – Urinary bladder
2 – Ureter
3 – Cowper’s gland
4 – Vas deferens
5 – Urethra
6 – Testis
7 – Scrotum
8 – Epididymis
- (ii) Fallopian tube or oviduct
- (iii) Scrotum is a sac-like structure which encloses the testes. Because it is situated outside the body cavity, it maintains the lower temperature favourable for the production of sperms.

(b)

- (i) Punnett square:
Both plants are with heterozygous round seeds (Rr)

Gametes	R	r
R	RR (Homozygous round seeds)	Rr (Heterozygous round seeds)
r	Rr (Heterozygous round seeds)	rr (Homozygous wrinkled seeds)

- (ii) Phenotypic ratio of the offspring in F₂ generation: 3:1
Genotypic ratio of the offspring in F₂ generation: 1:2:1
- (iii) Sex chromosomes in human males are X and Y.
Sex chromosomes in human females are XX.
- (iv) Mutation is the sudden change in one or more genes, or in the number or in the structure of chromosomes.
- (v) The number of chromosomes in the gametes of human beings is 23.

Answer 7

(a)

- (i) Ventricular systole
- (ii) Ventricles are contracting in this phase. In the diagram given, tricuspid valves and bicuspid valves are closed, while the semi-lunar valves are open.
- (iii) 1 – Pulmonary artery
2 – Aorta
3 – Bicuspid valve
4 – Semilunar valve (aortic semilunar valve)
- (iv) Oxygenated blood flows through '2', i.e. aorta.
- (v) '5' is pulmonary semilunar valve. It prevents the backflow of blood into the right ventricle at the time of ventricular diastole.
- (vi) Pericardium covers the heart.

(b)

- (i) Greenhouse effect:
Gases such as CO₂, methane, nitric oxide and nitrous oxide in the atmosphere act as greenhouse gases. Their increased concentration in the atmosphere prevents the escape of heat which warms the air. This is called greenhouse effect.
- (ii) Turgor pressure:
In a turgid plant cell, the pressure of the cell contents on the cell wall is called the turgor pressure.
- (iii) Selective reabsorption:
The glomerular filtrate entering the renal tubule contains many useful substances. Hence, as the filtrate passes down the tubule, water and other substances required by the body are reabsorbed. This reabsorption occurs only to the extent that the normal concentration of the blood is undisturbed. This entire process is called selective reabsorption.
- (iv) Natality:
The number of live births per 1000 people of population per year is called natality.
- (v) Pulse:
The pulse is the alternate expansion and elastic recoil of the wall of the artery during ventricular systole.