ICSE Board
Class X Biology
Board Paper 2016 (Solution)

SECTION I

Answer 1

(a)

(i) Crossing over
(ii) Population
(iii) Passive acquired immunity
(iv) Non-biodegradable wastes
(v) Pons

(b)

(i) C. Wall pressure exceeds turgor pressure
(The cell wall is unable to bear the turgor pressure after a certain time; it ruptures and the cell contents burst out.)

(ii) C. Thylakoids
(The individual flattened stacks of membrane material inside the chloroplast are known as thylakoids.)

(iii) C. Renal pelvis
(From the renal pelvis, urine is transported out of the kidneys through the ureters, tubes which carry the urine out of each kidney, to be stored in the urinary bladder.)

(iv) D. Hypersecretion of growth hormone
(Oversecretion or hypersecretion in childhood results in gigantism. Hypersecretion in adults causes acromegaly.)

(v) C. Calcium
(Calcium is necessary for blood clotting.)

***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*.**

(c)

(i) Odd term: Styrofoam
Category: Biodegradable materials

(ii) Odd term: Pepsin
Category: Nitrogenous bases of DNA

(iii) Odd term: Iris
Category: Parts of human ear (middle ear)

(iv) Odd term: Cortisone
Category: Hormones of the pituitary gland

(v) Odd term: Typhoid
Category: Genetic disorders

(d)

(i) Anti-diuretic hormone (ADH)
(ii) Posterior
(iii) Diabetes insipidus
(iv) Vasopressin
(v) Blood pressure

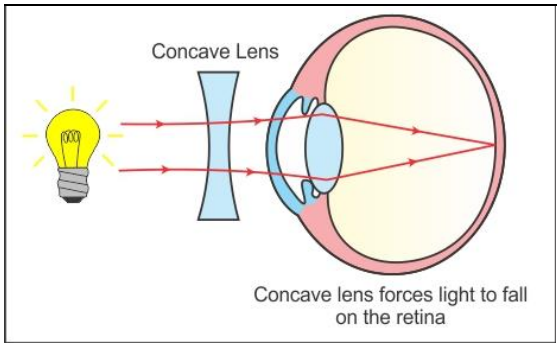
(e)

(i) At the centre of the chromosome joining the sister chromatids
(ii) Between tricuspid/bicuspid valves and papillary muscles of the heart
(iii) Base of the neck (below larynx)
(iv) Between iris and choroid (composed of ciliary muscles)
(v) Convoluted region near the Bowman's capsule

(f)

(i) Myopia
(ii) Two possible reasons are
- Eye ball is lengthened from front to back.
- Lens is too curved.

(iii) Concave lens
(iv)



(g)

(i) Blind spot: Free of rods and cones
(ii) Acrosome: Spermatozoa
(iii) Iris: Colour of eyes
(iv) Addison's disease: Hypoglycemia
(v) Cushing's syndrome: Hyperglycemia

(h)

(i) Defend the body against cancerous cells, pathogens and foreign matter
(ii) Produce male sex hormone called testosterone
(iii) Help to regulate the rate of transpiration by opening and closing of stomata
(iv) Equalises air pressure on either sides of the eardrum allowing it to vibrate freely
(v) Responsible for the secretion of the hormones oestrogen and progesterone in females

SECTION II

Answer 2

(a)

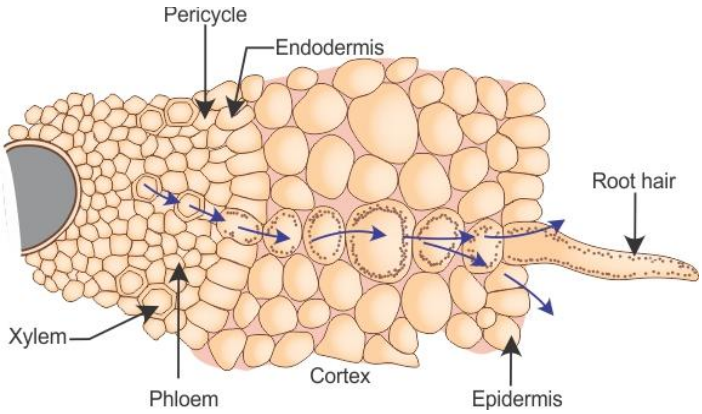
(i) 1: Root hair, 2: Soil particle, 3: Xylem vessel, 4: Vacuoles

(ii) Osmosis is the process which enables the passage of water from the soil into root hair.

(iii) Root pressure is responsible for the movement of water. It is the pressure developed in the roots because of the inflow of water.

(iv) Guttation

(v)



(b)

(i) Human skin cell contains 46 chromosomes, whereas human ovum contains 23 chromosomes.

(ii) Sperm duct transports the sperms into the urethra, whereas the fallopian tube transports the egg from the ovary to the uterus.

(iii) Red Cross looks after maternal and child welfare centres, whereas WHO promotes and supports projects for research on diseases.

(iv) Rods contain the pigment rhodopsin, whereas cones contain the pigment iodopsin.

(v) LUBB is produced by atrioventricular valves, whereas DUBB is produced by semilunar valves.

Answer 3

(a)

(i) 1: Pituitary gland, 2: Thyroid gland, 3: Pancreas, 4: Adrenal gland

(ii) Thyroid glands secrete the hormone thyroxine.
Function: Regulates basal metabolism

(iii) The endocrine part is the islets of Langerhans.

(iv) The pituitary gland is called the master gland because it controls several other hormone-releasing glands.
The hypothalamus of the forebrain controls the pituitary gland.

(v) The adrenal gland secretes the emergency hormone adrenaline.

(b)

(i) The apparatus is called Ganong's Potometer.

(ii) The phenomenon is called transpiration.

(iii) The evaporative loss of water in the form of water vapour from the aerial parts of plants is known as transpiration.

(iv) Two limitations are

- It is not easy to introduce the air bubble into the capillary.
- The twig may not remain fully alive for a long time.

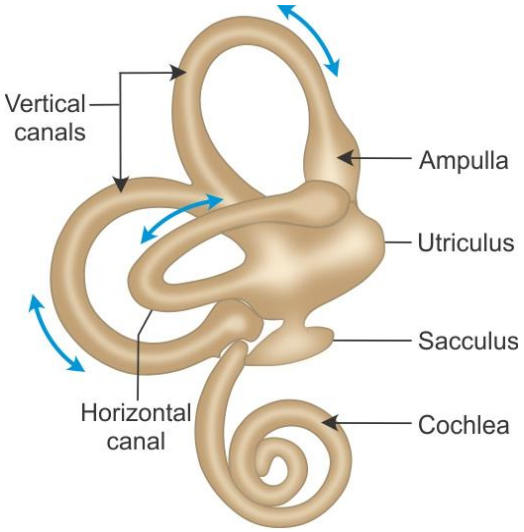
(v) The air bubble helps measure the rate of transpiration.

(vi) Transpiration occurs through roots.

Answer 4

(a)

(i)



(ii) 1: Cochlear duct
2: Semicircular canal
3: Oval window
4: Endolymph
5: Sensory cells in semicircular canals

(b)

(i) Menopause

(ii) Bilirubin

(iii) Hepatic portal vein

(iv) Inguinal canal

(v) Pollution

(vi) Excretion

(vii) Nucleotides

(viii) Mutation

(ix) Active transport

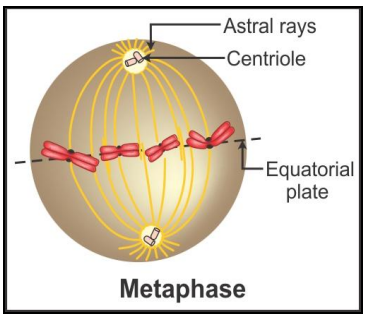
(x) Pulmonary vein

Answer 5

(a)

(i) Late prophase. The nuclear membrane and nucleolus disappear.

(ii)



The next stage is metaphase.

(iii)

Mitosis in Plant Cell	Mitosis in Animal Cell
1. Asters are not formed.	1. Asters are formed.
2. Occurs at the growing tips.	2. Occurs throughout the body.

(iv)

A. Mitosis

B: Meiosis

(b)

(i) Colour blindness is an X-linked disorder caused by a recessive gene. Males have only one 'X' chromosome and thus have only one copy of the gene which if recessive may lead to colour blindness. However, females have two 'X' chromosomes and both should possess the recessive gene for her to become colourblind, which occurs rarely.

(ii) The medulla oblongata is responsible for the control of various life processes such as breathing, heartbeat and blood pressure. Injury to the medulla oblongata may hamper any of the processes thus leading to death.

(iii) In case of fertilisation of the ovum by a sperm, the corpus luteum persists and continues to secrete progesterone in the body thus maintaining its high levels. The presence of progesterone prevents the maturation of another ovum, thus temporally stopping the menstrual cycle.

(iv) Mature RBCs lack a nucleus as it increases the surface area to volume ratio, making the absorption of oxygen more efficient. Also, the lack of mitochondria in these cells prevents the use of oxygen for themselves in cellular respiration, thus transporting all the oxygen absorbed and further increasing the efficiency of oxygen transport.

(v) As the ventricles of the heart contracts, they push the blood into the small lumen of the arteries with a great force, thus making the blood in the arteries flow in spurts and under pressure.

Answer 6

(a)

(i) 1: Umbilical cord
2: Placenta
3: Amniotic fluid

(ii) Functions of placenta:
- It allows the diffusion of oxygen, nutrients and immune products from the mother to the foetus.
- It allows the diffusion of waste material generated by the foetus to the mother to be excreted.

(iii)
- The amniotic fluid prevents the foetus from injury and shocks.
- It allows the foetus some amount of movement.
- It prevents the amnion from sticking to the foetus.
- It maintains an even pressure all around the foetus.

(iv) The time period required for the development of the foetus inside the uterus is called gestation. The normal gestation period in humans is 280 days (9 months).

(v) Male sex chromosomes: One 'X' chromosome and one 'Y' chromosome (XY)
Female sex chromosomes: Two 'X' chromosomes (XX)

(b)

(i) Release of oxygen during photosynthesis

(ii) The physiological process in question is photosynthesis. Photosynthesis occurs in green plants (autotrophs). It is the process by which plants prepare carbohydrates and oxygen in the presence of sunlight, carbon dioxide and chlorophyll.

(iii) 1: Gas/Oxygen
2: Hydrilla

(iv) $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6H_2O + 6O_2 \uparrow$

(v) The rate of bubbling will increase.

When sodium bicarbonate is added to water, it leads to the release of CO_2. An increase in the levels of CO_2 promotes photosynthesis and increases the rate of photosynthesis, thus in turn increasing the amount of oxygen released.

Answer 7

(a)

(i) Genotype of F_1 generation plants: TtRr
Phenotype of F_1 generation plants: Tall and red-coloured flowers

(ii) Possible combination of gametes obtained by the F_1 hybrids:

F_2 generation	TR	Tr	tR	tr
TR	TTRR	TTRr	TtRR	TtRr
Tr	TTRr	Ttrr	TtRr	Ttrr
tr	TtRR	TtRr	ttRR	ttRr
tr	TtRr	Ttrr	ttRr	ttrr

(iii) In case of two or more contrasting characters, the distribution of each member of one pair of characters in the gametes is independent of the distribution of the other pair.

(iv) Phenotypes of offspring obtained in the F_2 generation:
i. Tall plants with red flowers
ii. Tall plants with white flowers
iii. Dwarf plants with red flowers
iv. Dwarf plant with white flowers

(v) The phenotypic ratio obtained in the F_2 generation is 9:3:3:1.

(b)

(i) Reflex action:
A reflex action is an involuntary and quick response of the body initiated because of a stimulus. The commands for a reflex action originate from the spinal cord.

(ii) Power of accommodation:
The ability of the eye to adjust itself and to focus objects at different distances is known as the power of accommodation. 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.

(iii) Photophosphorylation:
The process by which a phosphate moiety is added to an ADP molecule using light energy to form an energy-rich ATP molecule is known as photophosphorylation. In photosynthetic plants, photophosphorylation occurs by two pathways—cyclic and non-cyclic.

(iv) Hormones:
Hormones are chemical regulators of the body which are synthesised by specific cells or glands of the body and poured directly into the blood, and they show their effects on their respective target cells or organs. Most of the hormones are produced by the endocrine glands; however, certain other glands may also produce hormones as a secondary function.

(v) Synapse:
A synapse is the point of contact between the terminal branches of the axon of one neuron with the dendrites of another neuron separated by a fine gap. The synapse allows the transmission of the nerve impulse from one neuron to the other through a chemical process.