

ICSE Board
Class X Biology
Sample Paper – 3 Solution

Time: 2 hrs

Total Marks: 80

SECTION I

Answer 1

(a)

- (i) *Pisum sativum* (Pea plant)
- (ii) Transpiration
- (iii) Magnesium
- (iv) Stomata
- (v) Telophase

(b)

(i)

Mitosis	Meiosis
Mitosis results in the daughter cells having the same number of chromosomes as the mother cell.	Meiosis results in each daughter cell receiving half the number of chromosomes.

(ii)

Cranial Nerves	Spinal Nerves
12 pairs of cranial nerves are present in adults.	31 pairs of spinal nerves are present in adults.

(iii)

Tubectomy	Vasectomy
Tubectomy is a birth control method in which the oviducts are ligated and the ligated ends are tied.	Vasectomy is a birth control method in which the vas deferens is ligated and the ligated cuts are tied.

(iv)

Colour Blindness	Night Blindness
Colour blindness is a sex-linked inheritance and is caused by the expression of its recessive allele present on the X chromosome.	Night blindness is a disorder caused by the deficiency of vitamin A.

(v)

Cerebrum	Spinal Cord
The outer portion of the cerebrum contains the cell bodies of the neurons and the inner portion contains axons of the neurons.	The outer portion of the spinal cord contains axons and the inner portion contains the cell bodies of the neurons.

(c)

- (i) Ear : Hearing :: Tongue : Taste
- (ii) Birth rate : Natality :: Death rate : Mortality
- (iii) Female reproductive cell : Ovum :: Male reproductive cell : Sperm
- (iv) Degenerative diseases : Parkinson's disease :: Allergies : Hay fever
- (v) Darwin: Theory of Natural Selection: Lamarck: Theory of Inheritance of Acquired Characters.

(d)

- (i) Centrosome; cell cytoplasm
- (ii) Grana of the chloroplasts; chloroplasts are located in the cell cytoplasm
- (iii) Thyroid gland; situated in the neck below the larynx
- (iv) Ear ossicles; present in the middle ear
- (v) Adrenal gland; located on the top of each kidney

(e)

- (i) Menarche
- (ii) Ovulation
- (iii) Menstruation
- (iv) Hydrotropism
- (v) Implantation

(f)

- (i) True.
- (ii) False. Cells which have lost their water content are said to be plasmolysed.
- (iii) True.
- (iv) True.
- (v) False. Darwin is regarded as Father of Evolution.

(g)

- (i) The type of lens used to correct myopia is concave.
- (ii) The basic unit of the human brain is the neuron.
- (iii) The scientific name of man is Homo sapiens.
- (iv) A non-degradable pollutant is DDT.
- (v) The period of complete development of the foetus till birth is termed gestation.

(h)

Column I	Column II (Answers)
(1) Pacemaker	(e) SA node
(2) Stroma	(g) Site of dark reaction
(3) Afferent nerve	(h) Transmits impulses from receptor organ to spinal cord
(4) Prolactin	(f) Stimulates production of milk by the mammary gland
(5) Sacculus	(a) Associated with static body balance

Section II

Answer 2

(a)

- (i)
 1. Oxytocin: It stimulates vigorous contraction of the uterine muscles during child birth. It also stimulates milk ejection.
 2. Thyroxine: It regulates the basal metabolism rate, i.e. the rate of cellular oxidation resulting in heat production at rest. In children, it is also responsible for growth.
 3. Vasopressin: It constricts blood vessels due to which blood pressure rises. It also increases the reabsorption of water by kidneys. Vasopressin is mainly responsible for maintaining the water content of the body.
- (ii) Defects of radioactive pollution on human health:
 1. Radioactive pollution may cause cancers such as leukaemia.
 2. It affects the functioning of the cell membrane and cell enzymes.

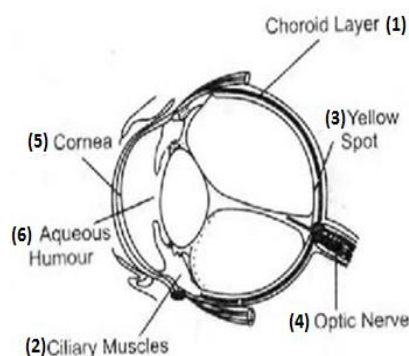
(b)

(i) Eutrophication:

Nitrates and phosphates help plants to grow. However, if these nutrients accumulate in water, algae use them as a source of food and multiply rapidly. The water in the lake soon becomes choked by a green slimy mass of green algae. This process is called eutrophication.

Algae use up oxygen. They also produce oxygen during photosynthesis. After a while, the algae start to die. A large number of bacteria feed on the dead plant material and use up so much of the oxygen that there is no oxygen left for the other aquatic animals. This leads to the death of these animals. The bacteria also thrive and eventually die. Thus, the water resource suffering from eutrophication eventually becomes stagnant and lifeless.

(ii) Vertical Section of the Human Eye:



Answer 3

(a)

(i) Principles proposed by Lamarck:

(a) Use and disuse:

Parts of the body which are used extensively become larger and stronger, while those which are not used deteriorate.

(b) Inheritance of acquired characters:

An organism could pass its modifications to its offspring.

(ii) Control measures to reduce noise pollution:

1. Restriction on loudspeakers, especially during the night
2. Planting trees by the road side

(iii) Apical dominance:

In majority of vascular plants, apical buds dominate over lateral buds. The growth of the lateral buds occurs only after the removal of apical buds. This phenomenon of suppression of the growth of the lateral buds is called apical dominance.

(b)

(i) 1. Aorta; 2. Left auricle; 3. Left ventricle; 4. Dorsal aorta; 5. Inferior vena cava; 6. Superior vena cava; 7. Pulmonary artery

(ii) The coronary artery supplies blood to the muscles present in the inner lining of the heart. If it gets an internal clot, then the blood supply will stop to the heart muscles. This will lead to the deadening of the corresponding area of heart muscles leading to myocardial infarction.

(iii) '5', i.e. the inferior vena cava carries deoxygenated blood.

(iv) Inferior vena cava (structure 5) has valves and a wider lumen, whereas dorsal aorta (structure 4) has no valves and a narrow lumen.

Answer 4

(a)

(i) Amniocentesis

(ii) Amniotic fluid

(iii) This process is helpful in the pre-natal diagnosis of the sex of the foetus.

(iv) This process establishes the sex of the foetus. Families desiring to have only a male child abort their baby in case they find the foetus is a female.

(v) 1. Placenta; 2. Amniotic cavity; 3. Foetal cells; 4. Uterine wall

(b)

- (i) 1. Lacrimal gland; 2. Duct of the lacrimal gland; 3. Eyebrow; 4. Eyelid; 5. Lacrimal sac; 6. Nasolacrimal duct; 7. Iris; 8. Pupil; 9. Lower eyelid
- (ii) Part 1 – Lacrimal gland produces tears. Part 2 – Duct of the lacrimal gland pours tears into the eye. Part 7 – Iris regulates the size of the pupil.
- (iii) In human beings, both the eyes face forward. This helps them to focus on the same object simultaneously. Due to this, humans can perceive depth and the relative distance of the object giving the image a three-dimensional effect.

Answer 5

(a)

- (i) Spinal cord
- (ii) 1. White matter; 2. Grey matter; 3. Dorsal root; 4. Ventral root; 5. Dorsal ganglion; 6. Sensory neuron; 7. Spinal nerve; 8. Association neuron
- (iii) The arrows indicate the direction of the flow of the impulse from the receptor to the spinal cord and from the spinal cord to the effector organ. The pathway is termed a reflex arc.
- (iv) The nerve shown in the diagram is a spinal nerve which is a mixed nerve.
- (v) Stimulus: Any change in the external or internal environment which results in a change in the activities of an organism.
Response: A change in the activity due to the stimulus.

(b)

- (i) 1. Sub-stomatal air space; 2. Stoma; 3. Hair; 4. Lower epidermis
- (ii) The figure is of a sunken stomata covered by hair in the leaf of *Nerium*.
- (iii) Disadvantages of transpiration:
 1. Transpiration causes stunted growth in plants.
 2. On a hot and bright sunny day, plants wilt which may sometimes result in death.
- (iv) Differences between transpiration and evaporation:

Transpiration	Evaporation
(i) Loss of water from the aerial parts of the plant is called transpiration.	(i) Loss of water from the surface of water bodies is called evaporation.
(ii) Formation of vapours continues for sometime even after the saturation of outside air.	(ii) Evaporation stops when the air is fully saturated.

Answer 6

(a)

Photosynthesis involves a light reaction and a dark reaction. During the light reaction, chlorophyll present in the (1) chloroplasts get activated by absorbing light energy. This energy splits (2) water molecules to (3) hydrogen and oxygen, and releases two electrons. This process is called (4) photolysis of water. The (5) hydrogen ions are picked up by NADP to form (6) NADPH. The ADP is converted to (7) ATP. This process is called (8) photophosphorylation. During the dark phase, the compound produced at the end of the light reaction reacts with carbon dioxide to form (9) glucose. This product is converted to starch. The process is called (10) polymerisation.

(b)

PARENTS: WW × ww
 (Purple flower, Male) (White flower, Female)
 GAMETES: W W w w
 Punnett square: F₁

	w	w
W	Ww (Purple)	Ww (Purple)
W	Ww (Purple)	Ww (Purple)

F₁ generation have purple flowers, but the whole progeny is heterozygous for the trait.

PARENTS: Ww × Ww
 (male) (female)
 GAMETES: W w W w
 F₂ Punnett square:

	W	w
W	WW (Purple)	Ww (Purple)
w	Ww (Purple)	ww (White)

Phenotype: 3(purple flowers):1 (white flower)

Genotype: 1(homozygous purple flower):2 (heterozygous purple flowers): 1 (homozygous white flower)

Answer 7

(a)

- (i) Excretory system, circulatory system and endocrine system
- (ii) 1. Left kidney; 2. Dorsal aorta; 3. Ureter; 4. Urinary bladder; 5. Urethra
- (iii) Nephron
- (iv) Urea and creatinine
- (v) Ultrafiltration and selective reabsorption

(b)

- (i) The father is polydactyl.
- (ii) Two daughters and two sons.
- (iii) Child 1 and child 3 show polydactyly.
- (iv) Child 2 and 4 have hands with a normal number of fingers.
- (v) Polydactyly is the condition in which a person has extra fingers or toes.