

ICSE Board Class X Biology Sample Paper – 15 Solution

Time: 2 hrs

Total Marks: 80

SECTION-I

Answer 1

(a)

- (i) Gene
- (ii) Inguinal canal
- (iii) Meiosis
- (iv) Potassium
- (v) Variations

(b)

- (i) Lamarck's theory
- (ii) Parasympathetic nervous system
- (iii) Abscisic acid
- (iv) Pinna
- (v) Myxoedema

(c)

- (i) False. Flaccidity is the condition in which the cell content is shrunken and the cell is no more tight.
- (ii) False. Mutation is the sudden change in one or more genes or in the number and structure of chromosomes in the progeny, which normally may not have existed in the parents or grandparents.
- (iii) True.
- (iv) True.
- (v) False. Menarche is the onset of menstruation in a female at about the age of 13 years.

(d)

- (i) Fertilisation is the product of **fusion of** the egg nucleus and the sperm nucleus.
- (ii) The pulmonary artery arises from the right ventricle and carries **<u>deoxygenated</u>** blood to the lungs for oxygenation.
- (iii) A reflex action is a spontaneous **<u>involuntary</u>** response to a stimulus.
- (iv) Concentration of urine by water reabsorption is controlled by anti-diuretic hormone secreted by the **posterior** pituitary gland.
- (v) Lamarck proposed the theory of inheritance of **<u>acquired</u>** characters.



(e)

Structure	Location	Function		
(i) Palisade	Below the epidermis of a green	Helps in photosynthesis as they		
cells	leaf	contain chlorophyll		
(ii) Prostate	Inferior to the urinary bladder	Secretes alkaline fluid which		
gland	encircling the urethra	increase the motility of sperms		
(iii) Acrosome	At the top of the head of the	Secretes an enzyme which helps in		
	sperms	dissolving the membrane of the		
		ovum so that the sperm can enter		
		for fertilisation		
(iv) Organ of	In the basilar membrane of scala	Transforms sound waves into		
Corti	media of the cochlea	nerve impulses		
(v) Mitral valve	At the aperture between the left	Regulates the flow of blood only in		
	auricle and the left ventricle	one direction		

(f)

(i) Differences between cobalt chloride paper and goat's bladder (process where it is used)

Cobalt chloride paper	Goat's bladder	
It is used in the process of transpiration.	It is used in the process of osmosis.	

(ii) Differences between hydrotropism and chemotropism (stimulus used)

Hydrotropism	Chemotropism		
It is the movement of the plant part in	It is the movement of the plant part in		
the direction of water.	the direction of chemicals.		

(iii) Differences between exocrine and endocrine glands (secretion transported by)

Exocrine gland					En	doc	rine gland		
Its	secretion	is	transported	through	Its	secretion	is	transported	through
ducts.						od.			

(iv) Differences between transpiration and guttation (define the terms)

Transpiration	Guttation		
It is the loss of water in the form of water	It is the loss of water in the form of		
vapour from the aerial parts of the plant.	liquid as droplets along the margin of		
	the leaves through hydathodes.		

(v) Differences between synapsis and synapse (explain the terms)

Synapsis						Synapse
It	is	the	pairing	of	homologous	It is the fine gap between two successive
chromosomes.					neurons.	



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(g)

- (i) Diapedesis
- (ii) Suspensory ligament
- (iii) Endometrium
- (iv) Zygote
- (v) Dura mater

(h)

- (i) Auditory canal \rightarrow tympanum \rightarrow ear ossicles \rightarrow oval window \rightarrow cochlea
- (ii) Ovulation \rightarrow fertilisation \rightarrow implantation \rightarrow gestation \rightarrow parturition
- (iii) Prothrombin \rightarrow thrombin \rightarrow fibrinogen \rightarrow clot \rightarrow fibrin
- (iv) Photons \rightarrow grana \rightarrow water molecules \rightarrow photolysis \rightarrow oxygen
- (v) Soil water \rightarrow root hair \rightarrow cells of cortex \rightarrow endodermis \rightarrow xylem



SECTION-II

Answer 2

(a)

- (i) $1 \rightarrow$ Hepatic vein
 - $2 \rightarrow \text{Hepatic artery}$
 - $3 \rightarrow$ Hepatic portal vein
 - $4 \rightarrow$ Vena cava/Inferior vena cava
 - $5 \rightarrow Aorta/Dorsal aorta$
- (ii) About 2 hours after a meal, the blood vessel which would be loaded with food material in solution is blood vessel 3, i.e. hepatic portal vein.
- (iii) Blood vessel 3 joins the small intestine to the liver so that the liver can monitor the blood glucose level. It can also help in detoxification and reduce the burden on the heart.
- (iv) Blood vessel B has a narrow lumen compared to blood vessel A. Blood vessel B is an artery which consists of a thick muscular wall. It has to pump the blood under great pressure to various parts of the body. Blood vessel A is a vein which has a wider lumen. A vein consists of a thin muscular wall because blood flows continuously and under very little pressure through it.
- (v) The three layers of which the walls of A and B are
 - Tunica externa
 - Tunica media
 - Tunica interna

(b)

(i) The pigments present are as follows:

Urine	Urochrome		
Cones of eye	Iodopsin		
Blood	Haemoglobin		
Leaves	Chlorophyll		

- (ii) Proper sequence of phases in the menstrual cycle:
 - Menstrual phase
 - Follicular phase
 - Ovulatory phase
 - Luteal phase

(iii)

- (a) Light should be white since the process of photosynthesis is maximum in white light as green plants reflect green light.
- (b) Destarching of plants will ensure that any starch present after the experiment has been formed only under experimental conditions.



Sample Paper – 15 Solution

Answer 3

(a)

- (i) 1. Cerebrum
 - 2. Cerebellum
 - 3. Medulla oblongata
 - 4. Spinal cord
- (ii) The difference in the arrangement of nerve cells in the part marked 1 and 4 is as follows:

The outer portion of part 1 (cerebrum) contains cytons of the nerve cells and being greyish in colour makes grey matter outside. The inner portion of the cerebrum contains mainly the axons of the nerve cells and being white in colour makes white matter inside.

The part marked 4 (spinal cord) shows white matter outside and grey matter inside, since cytons are present inside and axons of the nerve cells are present outside.

- (iii) The fluid which surrounds the brain is cerebrospinal fluid. Its function is to protect the brain from jerks and jolts (shock absorber) and maintains constant pressure in and around the brain.
- (iv) A stimulus is an agent or change in the external or internal environment that induces a reaction in the body.
- (v) Mixed nerves carry both sensory and motor fibres or nerves.
- (vi) A person walks clumsily when drunk because alcohol affects the cerebellum, which is the centre that controls and coordinates muscular activities.

- (i)
- (a) Nerve cell
- (b) Guard cells
- (c) Interstitial cell/Leydig cell
- (d) Foetal cell
- (ii) In most vascular plants, growth of the lateral buds occurs only after the removal of the apical buds. This phenomenon of suppression of the growth of the lateral buds by the apical buds is called apical dominance.
- (iii) <u>Structure of internal ear:</u>





Sample Paper – 15 Solution

Answer 4

(a)

(i) Stages of cell division in a sequential manner:



(ii) A – Prophase B – Metaphase C – Anaphase D - Telophase (iii) Parts visible in the diagrams are

- 1. Centromere
- 2. Spindle fibres
- 3. Sister chromatids
- 4. Cell plate
- (iv) It is a plant cell because cell plate formation takes place during telophase. Also, centrioles are absent and a cell wall is present in the given diagrams.

- (i) Phenotypes of (i), (ii) and (iii) are
 (i) Normal woman but carrier of colorblindness
 (ii) Colourblind man
 (iii) Normal man
- (ii) Red-green colourblindness is more likely to occur in men than in women because such a defect is due to the recessive genes which occur on the X chromosome. In females (XX), it is less likely that both X chromosomes will carry the defective gene. So, if either of the X chromosome carries the defective gene, the gene being recessive, its influence will be masked by the normal gene present on the other X chromosome. However, in males (XY), if the defective gene is present on the X chromosome, there is no other normal gene on the Y chromosome to mask the effect of the defective gene. As a result, the recessive gene gets expressed and the defect for colourblindness occurs.



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(iii) Mendel selected pea plants for his experiments because

- Many varieties of pea plants having contrasting traits were available.
- Pea varieties were available in pure forms that bred true.
- Pea flower is bisexual, so it can be normally self-pollinated.
- Self-pollination could be prevented by removing the corresponding reproductive parts of the flower.
- The size of the flower is very convenient, so cross pollination can be done artificially.
- Two crops can be produced in one year since the reproductive span of pea plant is very short.

(iv)

S. No.	Character	Dominant	Recessive
1	Plant height	<u>Tall</u>	<u>Dwarf</u>
2	Seed shape	Round	<u>Wrinkled</u>



Answer 5

(a)

- (i) 1. Sclera/Sclerotic layer
 - 2. Choroid
 - 3. Retina
 - 4. Optic nerve
 - 5. Iris
- (ii) <u>Function of part 2 (choroid)</u>:
 - It prevents the light rays from reflecting and scattering inside the eyes.
 - It also provides nourishment to the organ since it is richly supplied with blood vessels.
- (iii)Myopia or near sightedness or short sightedness.
- (iv) Myopia occurs because
 - The eyeball is lengthened from front to back (eyeball of too great depth).
 - The lens is too curved or convex.
- (v) Concave lens is used to correct myopia.
- (vi) The power of glasses used is mentioned in minus for this defect.

- (i) Transpiration is the price paid for photosynthesis as stomata is open for allowing carbon dioxide to diffuse in for photosynthesis and at the same time water vapour escapes. This means transpiration is incidental to photosynthesis.
- (ii) It is necessary to maintain a normal osmotic concentration of blood so that the tonicity between the blood and the body tissues does not differ; otherwise, the fluid may leave or enter the cells of the tissues from the blood which can get damaged and homeostasis of the body is disturbed. Also, the red blood cells can become turgid or flaccid.
- (iii) Our resources cannot keep pace with the rising population of the country because food production increases in arithmetic progression, while population grows in geometric progression. It means that food production will fall short for a rising population. Due to rapid rise in population, deforestation has also occurred in order to provide housing and agricultural land to the people.
 - (iv) Heat production by the body is controlled by the thyroid gland. Due to ageing, heat production is lowered and the body activities also slow down. So, older people tend to feel more cold than youngsters.
- (v) The fully grown embryo respires and not breathes because oxygen which is dissolved in the mother's blood diffuses into the embryo for oxidation of glucose in the cells where energy is liberated. As the lungs lie collapsed in the embryo and functions only after the foetus is expelled from the body of the mother, the embryo receives oxygen by diffusion of gases and there is no breathing movements.



Answer 6

(a)

- (i) The aim of the experiment is to show that carbon dioxide is necessary for photosynthesis.
- (ii) KOH solution is kept inside the bell jar to absorb the carbon dioxide present in the jar.
- (iii)Soda lime is used to absorb the incoming carbon dioxide from the air.
- (iv) The last and final step in photosynthesis experiments is to test for the presence of starch.
- (v) In the final step, the leaf does not turn blue black with iodine solution showing that carbon dioxide is necessary for photosynthesis.

(b)

- (i) <u>Ethylene</u>:
 - Induces fruit ripening.
 - Promotes senescence.
- (ii) <u>Crystalline lens</u>:
 - Changes its shape and functions to change the focal distance of the eye so that it can focus on objects at various distances, thus allowing a sharp real image of the object of interest to be formed on the retina.

(iii)<u>Hypothalamus</u>:

- Releases hormones.
- Regulates body temperature.
- (iv) Penis:
 - Transfers sperms into the female genital tract.
- (v) <u>Seminal vesicles:</u>
 - Produces a secretion which serves as a medium for the transport of sperms.



Answer 7

(a)

- (i) The arrows outside the blood capillary indicate the flow of blood.
- (ii) The arrow coming out of gland A indicates the direction of flow of hormone in the blood capillary.
- (iii) Pituitary
- (iv) The flow of the hormone cannot be in both directions. It should be in the direction of the flow of blood.
- (v) Thyroxine

- (i) Crossing over
- (ii) Meiosis
- (iii) 1 Chromatid
 - 2 Centromere
- (iv) The most significant aspect of meiosis is that the chromosome number is halved.
- (v) During meiosis, the chromosomes arrange in homologous pairs and split longitudinally to make a tetrad. Chromosome pairs get separated (first reduction division). The centromere splits and chromatids of each chromosome separate to become independent chromosomes (second reduction division). This is called linkage and crossing over.