# Nagaland Board
# Class XI
# Biology
# Sample Paper 2 – Solution

## PART A

**1.** (i)
Gibberellin increases the length of hypocotyls and cotyledonary leaf area during germination. GA induces synthesis of α-amylase and other hydrolytic enzymes in seeds of monocots and dicots.

**2.** (iv)
Succinate dehydrogenase is present on the inner membrane of mitochondria and catalyses the oxidation of succinate to fumarate.

**3.** (i)
Molybdenum is the essential constituent of nitrogenase enzyme. Nitrogenase is a Mo-Fe protein and catalyses the conversion of atmospheric nitrogen into ammonia.

**4.** (i)
The primary and secondary phloem gets crushed due to the continuous formation and accumulation of the secondary xylem. However, the primary xylem remains intact in the centre of the stem.

**5.** (i)
The legume or pod develops from a monocarpellary gynoecium. It is a dry dehiscent fruit which occurs in Leguminosae plants such as pea, gram, bean and groundnut.

**6.** Gibberellins help in stem elongation in plants. In sugarcane, sugar is stored in stems. Use of gibberellin ensures an increase in the stem length of sugarcane; hence, the yield increases.

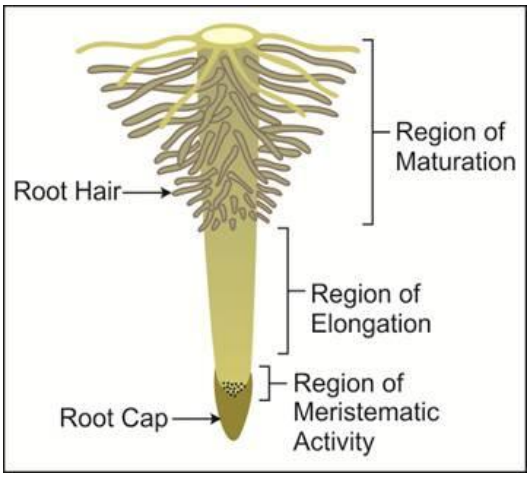
**7.** No. The plant cannot carry out photosynthesis without chlorophyll *a* because it is the reaction centre for photosynthesis.
Chlorophyll *b* and other accessory pigments absorb light at other wavelengths and pass it to the reaction centre for efficient photosynthesis.

**8.** The process of conversion of nitrogen to ammonia is called nitrogen fixation. Ultraviolet radiation and lightning provide energy for nitrogen fixation.

**9.** In Ulothrix, reproduction may occur by the following methods:
(a) Vegetative reproduction by fragmentation or by formation of different types of spores.
(b) Asexual reproduction by flagellated zoospores.
(c) Sexual reproduction by the isogamous, anisogamous or oogamous fusion of gametes.

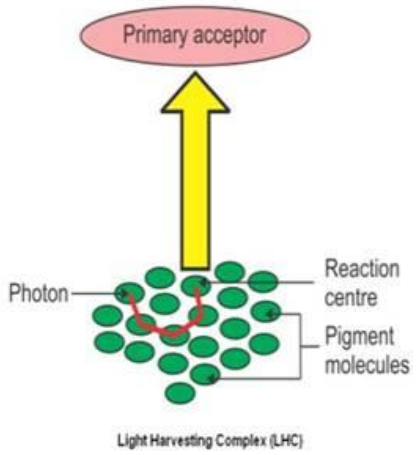
**10.** Jasmine: A slender lateral branch arises from the base of the main axis. After growing aerially for some time, it arches down to touch the ground.
*Chrysanthemum*: The lateral branches originate from the basal and underground portion of the main stem. It grows horizontally beneath the soil and comes out obliquely upwards to give rise to leafy shoots.

**Or**




**11.** In hydroponics, a series of experiments are conducted in which roots of plants are immersed in a nutrient solution.
Then an element is either added or removed or provided in varied concentration in the solution according to its suitability to the plant and its growth.
Plants are grown in tubes or troughs placed at a slight incline.
A pump is provided which circulates the solution from a reservoir to the elevated end of the tube.
The solution flows down the tubes and returns back to the reservoir.
The roots of the plants get bathed continuously in an aerated solution.

**12.**




(a) LHC is a group of pigment molecules which are associated with each other and help carry out photosynthesis.

(b) LHC is made of hundreds of pigment molecules except for only one chlorophyll *a* molecule forming a light-harvesting system also called antennae.

(c) The single chlorophyll *a* molecule forms the reaction centre, while the other pigments serve as accessory molecules and make photosynthesis more effective by absorbing light of different wavelengths.

**Or**

(a) Hatch and Slack pathway is a cyclic pathway for $CO_2$ fixation.
(b) The primary $CO_2$ acceptor is a 3-carbon compound phosphoenol pyruvate (PEP) which is present in mesophyll cells.
(c) PEP in the mesophyll cells is converted to oxaloacetic acid (OAA), which is then further converted into a 4-carbon compound such as malic acid or aspartic acid, which is then transported to the bundle sheath cells.
(d) In the bundle sheath cells, it is again broken down into a 3-carbon compound with the release of $CO_2$.
(e) $CO_2$ released enters the Calvin cycle in the bundle sheath cells, while the 3-carbon compound is transported back to the mesophyll cells.
(f) In the mesophyll cells, the 3-carbon compound is converted back to PEP, thus completing the cycle.

**13.**

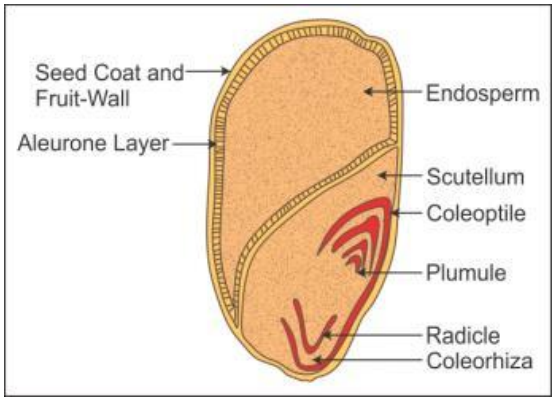
(a) During pollination, the pollen grains germinate on the stigma.
(b) This results in the formation of pollen tube which grows through the style and reaches the ovule.
(c) When the pollen tube enters the sac, two male gametes are discharged.
(d) One male gamete fuses with the egg cell and forms a zygote.
(e) The second male gamete fuses with the diploid secondary nucleus and produces the triploid primary endosperm nucleus (PEN).
(f) Because the fusion occurs twice, it is called double fertilisation.
(g) The zygote develops into an embryo, while the primary endosperm nucleus develops into endosperm.
(h) The endosperm provides nourishment to the developing embryo.
(i) The synergids and antipodals of the egg apparatus degenerate after fertilisation.
(j) At the end of this cycle, ovules develop into seeds which give rise to a new plant (sporophyte) while ovaries develop into fruits.

**Or**

The different regions of the root are as follows:

(a) Root cap: It covers the apex of roots which grow through the soil.
(b) Region of Meristematic Activity: This region is a few millimetres above the root cap. The cells are thin-walled and small with dense protoplasm. The cells divide repeatedly.
(c) Region of Elongation: This region is proximal to the region of meristematic activity. The cells in this region undergo rapid elongation and enlargement. This zone is responsible for the growth in length of the root. These cells gradually differentiate and mature.
(d) Zone of Maturation: The zone of maturation is proximal to the zone of elongation. Its epidermal cells give rise to root hair cells which absorb water from the soil.

**14.** The seed coat which covers the seed is membranous and fused with the cell wall.



(a) The endosperm is bulky, and it serves as the food reserve.
(b) The outer covering of the endosperm is a proteinous layer called the aleurone layer.
(c) A small embryo is located in a groove at one end of the endosperm.
(d) A large shield-shaped cotyledon called the scutellum is present.
(e) The embryo has a short axis with the radicle and plumule.
(f) The radicle and plumule are enclosed in sheaths called coleorhiza and coleoptile, respectively.

**Or**

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## PART B

**1.** (b)
Bioluminescence is the production of light with very little heat by a chemical reaction within an organism. This is seen in ctenophores such as comb jellies.

**2.** (b)
The coelomic fluid in earthworm is water plasma which contains proteins, salts and corpuscles (viz. phagocytes, leucocytes, mucocytes and eleocytes).

**3.** (d)
The hormone which stimulates the secretion of gastric juice is gastrin. It is secreted by the parietal cells of the stomach and aids in gastric motility.

**4.** (d)
A spirometer is an instrument used for recording the changes in the volume of air in and out of the lungs. This process is called spirometry.

**5.** (c)
All secretion by the pituitary gland is controlled by a hormonal signal from the hypothalamus. The neurohormones are secreted and accumulated by the hypothalamus.

**6.** Pneumatic bones in Aves keep the animal body light and hence help in flight. Air sacs in birds help in respiration and buoyancy.

**7.** A flagellum is the locomotory organ in motile bacteria. The filament is its longest portion.

**8.** When the intra-pulmonary pressure, i.e. the pressure within the lungs, is lesser than the atmospheric pressure, the diaphragm contracts.
The contraction of the diaphragm increases the volume of the thoracic chamber, thus increasing space for more air which is withdrawn during inspiration. Hence, the person is able to inspire

**9.** Electrocardiogram or ECG is the graphical representation of the electrical activity of the heart during a cardiac cycle. It is measured or monitored by an electrocardiograph. Any deviation or change in the shape of ECG indicates a cardiac disorder or abnormality

**10.**

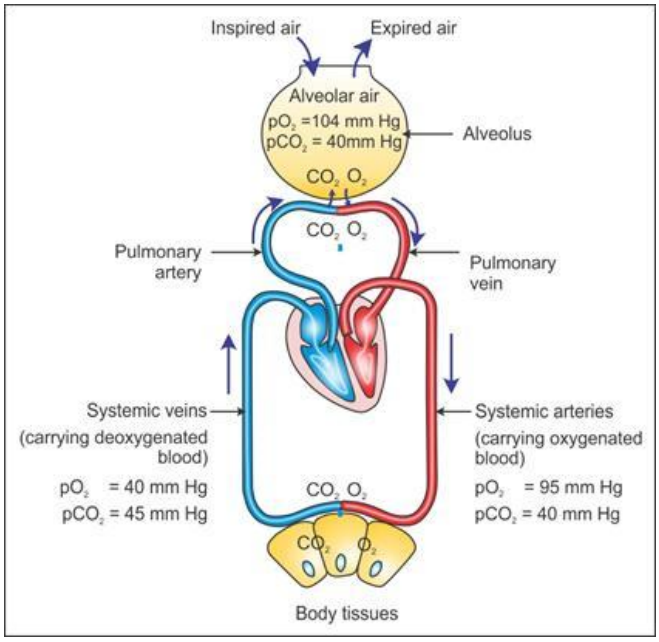
(a) A fall in glomerular blood pressure activates the juxta glomerular cells to release renin.
(b) Renin converts angiotensin, first to angiotensin I and then to angiotensin II.
(c) Angiotensin II increases the glomerular blood pressure which increases the glomerular filtrate rate (GFR).
(d) At the same time, angiotensin II activates the adrenal cortex to release aldosterone.
(e) Aldosterone stimulates the reabsorption of sodium ions and water from DCT. This also results in an increase in GFR.

**Or**

(a) Maintenance of the glomerular filtration rate is carried out by the juxtaglomerular apparatus in the kidneys.
(b) It is the region formed by the close contact between the distal convoluted tubule and the afferent arteriole at a region.
(c) When GFR falls, it stimulates JGA to release rennin.
(d) Renin helps to bring reduced GFR back to normal.

**11.** Some cells do not exhibit cell division or some cells divide only when the body has lost cells during an injury. Such cells enter the quiescent stage. In this stage, the cells are metabolically active. However, the cells do not divide. They undergo division only when there is a requirement by the body under certain conditions.

**12.**




**Or**

For the formation of oxyhaemoglobin, the factors required such as high $pO_2$, low $pCO_2$, low concentration of $H^+$ ions and low temperature are maintained in the alveoli. Hence, the binding of oxygen with haemoglobin at lung surfaces is faster.

Low $pO_2$, high $pCO_2$, high H+ ion concentration and high temperature are the factors found in tissues which always favour the dissociation of oxygen.

**13.**

Uraemia is the accumulation of urea in the blood due to malfunctioning of the kidneys.

In individuals suffering from uraemia, the waste substances are removed by haemodialysis.

In this process, blood is drained from the convenient artery (usually radial artery), mixed with anticoagulant such as heparin and pumped into the dialysing unit.

The dialysing unit consists of a coiled tube surrounded by a dialysing fluid.

The dialysing unit has the same composition as that of the plasma membrane, but it does not contain any nitrogenous waste.

The absence of nitrogenous water in the dialysing unit enables the easy movement of waste from urine into the tube through the porous membrane, thus clearing the blood from any waste.

The cleared blood is then pumped back into the body through the same vein after adding anti-heparin.

**Or**

| Mitosis | Meiosis |
|---|---|
| Two daughter cells are formed. | Four daughter cells are formed. |
| Cytoplasm and nucleus divide once during cell division. | Cytoplasm and nucleus divide twice during cell division. |
| Mitosis occurs in diploid cells, but it also occurs in some haploid cells. | It occurs in diploid cells. |
| It helps in growth and cell repair in organisms. | It helps maintain a constant number of chromosomes in a species. |

**14.**

Steps involved in respiration:

(a) Atmospheric air is drawn in to obtain oxygen, and carbon dioxide-rich air is released out. This process is called breathing or pulmonary ventilation.
(b) Diffusion of oxygen and carbon dioxide occurs at the alveolar membrane.
(c) Gases are transported by the blood at the tissue level.
(d) Diffusion of oxygen and carbon dioxide is at the tissue level.
(e) Use of oxygen by the cells during the catabolic process results in the release of carbon dioxide.

**Or**

Characteristic features of phylum Porifera:

(a) Poriferans are marine animals.
(b) They are asymmetrical.
(c) They exhibit cellular level of organisation.
(d) Sponges are hermaphrodite, i.e. eggs and sperms are produced by the same individual.
(e) Sponges show the presence of a water canal system which helps in reproduction and gathering of food from the surrounding water, gas exchange and excretion.
(f) Skeleton is made of spongin fibres or spicules.
(g) Fertilisation in sponges is internal.
(h) Digestion is intracellular.
(i) Special cells called choanocytes are present on the internal lining of the spongocoel.
(Any 5)

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