# Grade 10 Biology Kerala 2015

**Time: $1^{1/2}$ Hours** **Total Score: 40**

**Instructions:**

- Read carefully the question before answering them.
- Score for each question is given against the concerned questions.
- 15 minutes are given as cool off time. This time is to be used for reading and understanding the question.

Q1. Find out the relationship between the pair of words and fill up the blanks:

(a) Rod cells : Rhodopsin

Cone Cells: _____

(b) Cranial nerve : Communication from brain to organ

_____: Communication from spinal cord to organ

(c) Water vapor : Stomata

Water droplet : _____

**Solution:**

(a) Photospin

(b) Spinal nerve

(c) Hydathodes

Q2. Find the odd one out and identify the common features of the others:

(a) Dengue fever, Swine flu, Ringworm, Chikungunya

(b) Bt-Cotton, Superbug, Iguana, Bt-Brinjal

**Solution:**

(a) Odd one - Ringworm (a fungal infection).

Others are viral infections.

(b) Odd one – Iguana (a reptile).

Others are products of genetic engineering

Q3. "Germs, both alive and dead are used to get immunity." Substantiate the statement with vaccines used for rabies and tuberculosis.

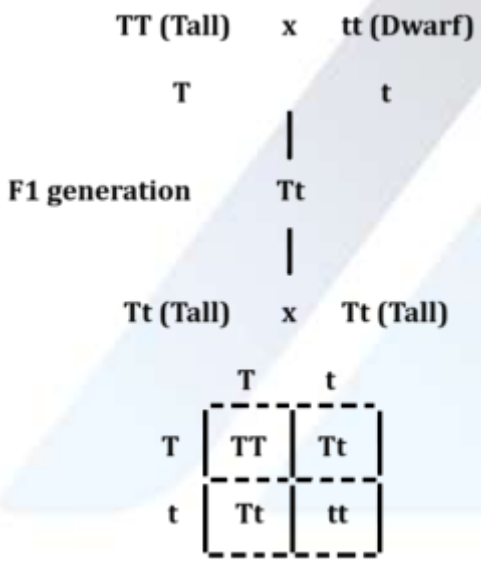
**Solution:**

In the rabies vaccines that fight against rabies, dead germs are used. Alternatively, in BCG, vaccines are used against tuberculosis, live, but inactive vaccines are used. So, this can substantiate the statement that "Germs, both alive and dead are used to get immunity."

Q4. Diagrammatically represent the symbols with the First generation of progenies of Tall and Dwarf pea plants when cross-pollinated as in Mendel's first stage of Experiment.

**Solution:**

When these two plants are crossed, the alleles from the parents combine in the following way:




In F2 Generation we get **3 Tall** (TT or Tt) **: 1 Dwarf** (tt) offspring.

This illustrates Mendel's first law of inheritance, the **Law of Segregation**, showing how alleles segregate and recombine during reproduction.

Q5. "Receptors are modified neurons." Justify the statement with examples of receptors in different sense organs.

**Solution:**

Receptors are modified neurons that detect stimuli and convert them into electrical signals, which are transmitted to the brain.

E.g. of receptors in different sense organs include:

- **Eyes (Visual Receptors):** Rods and cones in the retina detect light and send signals to the brain.
- **Tongue (Taste Receptors):** Taste buds detect chemicals and send signals for taste perception.
- **Ears (Auditory Receptors):** Hair cells in the cochlea detect sound vibrations and transmit signals to the brain.

These receptors are specialized neuron-like cells that enable sensory perception.

Q6. Write your inference by analyzing the following information in connection with Evolution.

| |
|---|
| No of amino acids in $\beta$ chain of |
| **Man is - 146** |
| The variation in the number of amino acids in the $\beta$ chain:- |
| **Chimpanzee - Nil** |
| **Gorilla - 1** |
| **Rhesus Monkey - 8** |
| **Dog -16** |

(a) Substantiate the reason for the variation of amino acids of protein like haemoglobin in the above organisms.

(b) Write the advantage of the micro-level knowledge of protein and genes of the related organism.

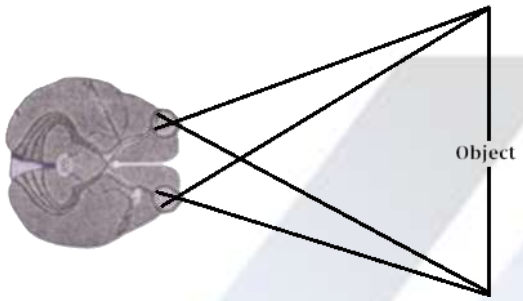
**Solution:**

(a) The changes in the amino acid sequences of haemoglobin across different organisms are due to **mutations** and **natural selection**, reflecting their evolutionary relationships. Despite these sequence differences, the basic structure

and function of haemoglobin—oxygen binding—remain the same. This variation helps trace evolutionary links, showing that humans, chimpanzees, gorillas, and rhesus monkeys share a recent common ancestor. Dogs and other animals like kangaroos have a more distant common ancestor with these primates. For example, human and gorilla gene sequences differ by only 1.6%, but gene copy numbers may vary, emphasizing their close evolutionary connection.

(b) Understanding the micro-level details of proteins and genes enhances our understanding of evolutionary relationships, highlighting similarities and differences between species. It aids in classification, helps identify genetic traits, and supports research in genetics and evolutionary biology.

Q7. Name the process represented in the following illustration. Write the peculiarity of the image formed in the labelled sense organ.




**Solution:**

This image represents the path of impulses from both the retinas/eye to the brain. When an image from two sides of the same object are formed in the right and the left eye, they are combined in the visual area of the cerebrum in the brain to create a three-dimensional image of the object. This is Binocular vision. Usually, inverted images are formed at the back of our eye, but here that is not the case.

Q8. "Some specific process during Meiosis helps to create variation in character among organisms."

(a) Analyse this statement and explain the process.

(b) What happens if sudden changes occur in chromosome number and structure? Cite examples.

**Solution:**

(a) Meiosis is a cell division process, which takes place in two phases resulting in the creation of 4 haploid gametes. This two-step procedure will reduce the number of chromosomes into half, thus resulting in the formation of egg and sperm cells. The chromosome count goes from 46 to 23. This is one of the reasons why human embryo has 46 chromosomes from birth.

(b) Any change, addition or deletion of the chromosomal part causes alteration of number, position or sequence of genes in the chromosome. This alteration of the structure is referred to as chromosomal aberrations or chromosomal mutations. Students can know more about chromosomal disorder in humans from here.

Q9. Match the item in column B and C with systems of treatment given in column A.

| A | B | C |
|---|---|---|
| (a) | Sages and Maharishis | Lifestyle maintain the body fit |
| Homeopathy | Samuel Haniman | (b) |
| Allopathy | (c) | Importance to diagnosis treatment and medicine |

**Solution:**

(a) Ayurveda

(b) Used to restore the health of the sick

(c) Samuel Hahnemann

Q10. Analyse the observation report given in the lab record of Laya.

| Urine Sample | Colour |
|---|---|
| A | Blue |
| B | Green |
| C | Yellow |
| D | Orange |
| E | Red |

(a) Mention the name of the reagent used to test in these sample solutions.

(b) Which among the samples contain the highest concentration of glucose?

(c) What might be the endocrine malfunction that leads to this condition?

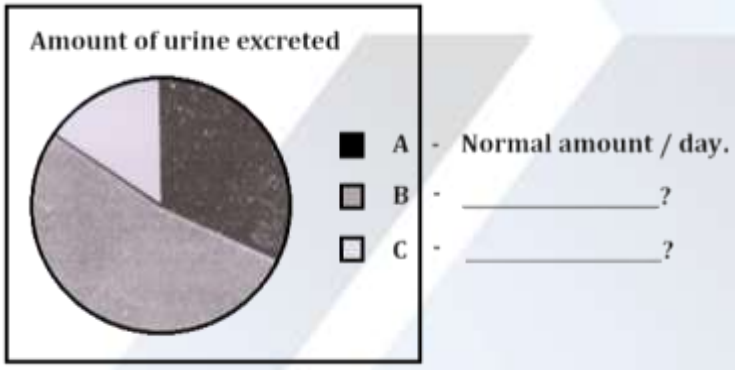
**Solution:**

(a) The presence of glucose in the urine can be a sign of diabetes and testing a urine sample with Benedict's reagent is a simple way of checking for the existence of glucose in people. This is a solution of copper sulfate, sodium carbonate and sodium citrate in water.

(b) The E sample with Red urine contains the highest concentration of glucose

(c) Failure of the pituitary gland leads to this condition

Q11. Observe the graphical representation of the amount of urine excreted from a person in different season and answer the question given below.




(a) Mention the seasons at which B and C appears.

(b) Elucidate the reason for variation in quantity of urine in B & C.

(c) Name the deficiency of hormone which leads to excessive loss of water through Urine.

**Solution:**

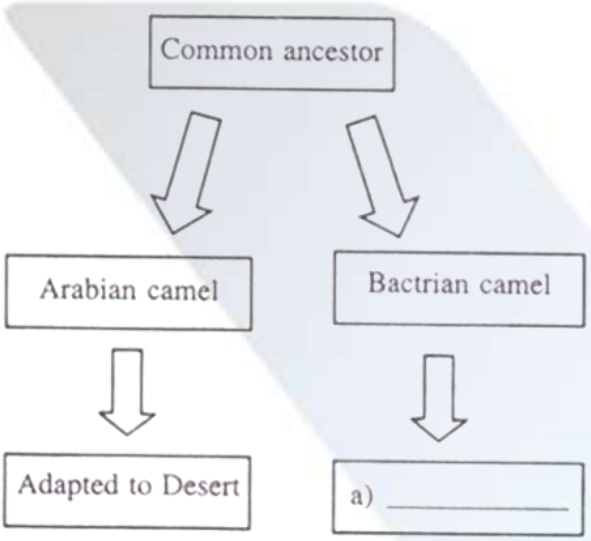
(a) **B** appears in **cold climate (winters)**, or **monsoon season**

**C** appears in **hot weather** or **summer season**

(b) Reason for variation in the quantity of urine in B and C is the variation of water lost as sweat or variation of water reabsorbed.

c) The deficiency of hormone that leads to excessive loss of water through urine is antidiuretic hormone is ADH.

Q12. Observe the flow chart and answer the question below:




(a) Complete the flow chart.

(b) Name the process by which these two camels were evolved.

(c) What are the reasons which led to this kind of process?

**Solution:**

(a) Adapted to a cold desert

(b) The process by which the two camels are evolved is the divergent evolution.

(c) Accumulation of favourable variations inherited through generations is the reason that led to this kind of process.

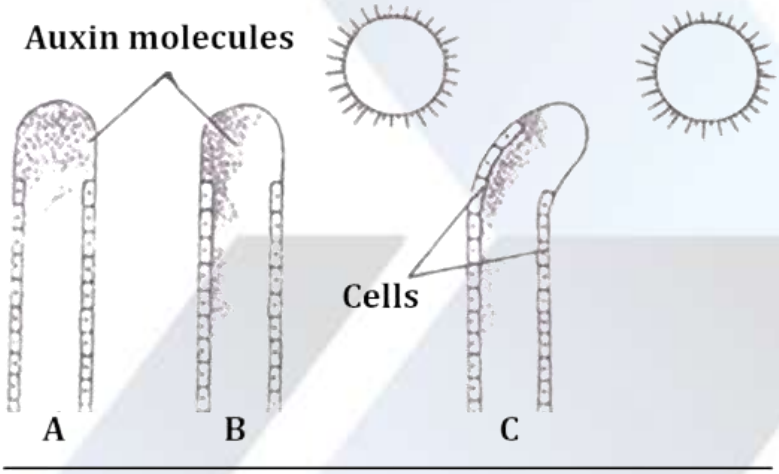
Q13. Match column B and C with column A.

| A | B | C |
|---|---|---|
| Tuberculosis | Protozoa | Contact |
| Dysentery | Filarial Larvae | Anopheles mosquito |
| Malaria | Bacteria | Food/water |
| Ringworm | Plasmodium | Culex mosquito |
| | Fungus | Air |

**Solution:**

| A | B | C |
|---|---|---|
| Tuberculosis | Bacteria | Air |
| Dysentery | Protozoa | Food/water |
| Malaria | Plasmodium | Anopheles mosquito |
| Ringworm | Fungus | Contact |

Q14. Observe the illustration given below and answer the three questions.




(a) What kind of hormone action is represented in illustration?

(b) Draw the opposite action of these hormones in the plant root.

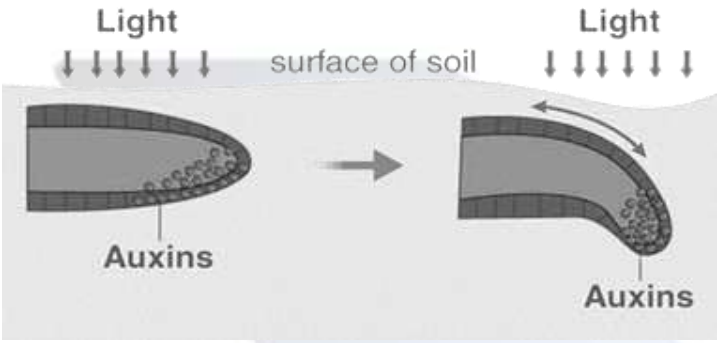
(c) List out some artificial plant hormone that can be utilized in agriculture.

**Solution:**

(a) Auxins, a plant hormone found in the stem tip control cell elongation in a plant. In the shoots, the shaded side contains more auxin and grows longer, thus causing the shoot to bend towards the light.

(b) Auxins in roots **inhibit cell elongation** in regions with higher concentrations. When a root is placed horizontally, auxins accumulate on the bottom side, reducing growth there. The top side, with lower auxin concentration, grows faster,

causing the root to **bend downward**, exhibiting opposite action of auxin in roots (negative phototropism).



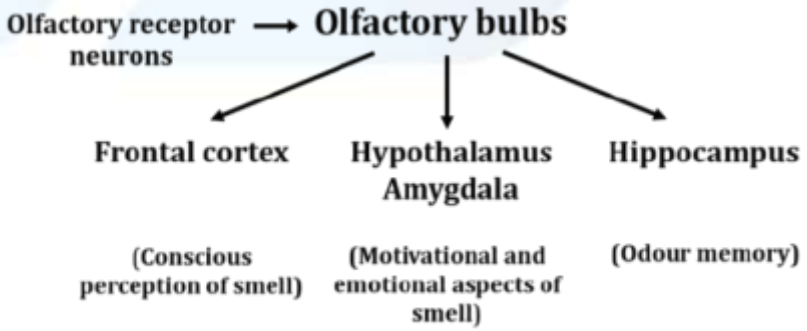

(c) Artificial plant hormones like **2,4-D (2,4-dichlorophenoxyacetic acid)** and **NAA** (naphthalene acetic acid) are widely used in agriculture to promote root development, control weeds, and enhance fruit production. **IBA (indole-3-butyric acid)** is another synthetic auxin used to stimulate rooting in cuttings.

Q15. Make a flow chart showing the sequential stages to feel the smell.

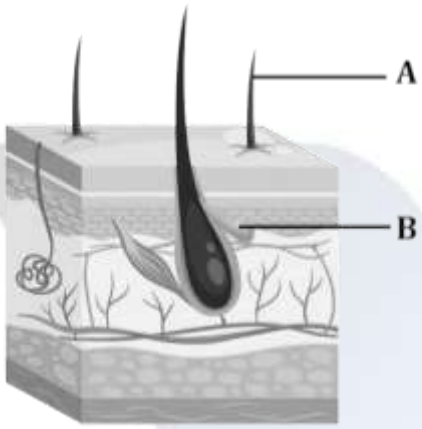
**Solution:**

The sequential stages to feel the smell:

Odour molecules released → Enter the nasal cavity → Bind to olfactory receptors in nasal epithelium → Nerve impulses generated by receptors → Impulses travel via olfactory nerve to the brain → Brain processes the signal in the olfactory bulb and cortex → Smell is identified and perceived.



Q16. Observe the following figure and answer the given questions.




(a) Label A and B.

(b) How do they protect your body?

**Solution:**

(a) This is the structure of skin.

- Label A - Hair
- Label B - Sebaceous gland.

(b) Hair and sebaceous glands protect the body by acting as a barrier and maintaining skin health:

- Hair traps dust, microbes, and harmful particles, shielding sensitive areas like the scalp, nostrils, and eyelashes.
- Sebaceous glands secrete sebum, a natural oil that moisturizes the skin, prevents dryness, and creates a slightly acidic environment to inhibit microbial growth.

It protects the skin against sunburn, damage caused by UV rays and more.