

**Code:313.**

## **BIOLOGY**

### **Previous year question paper**

1. What is placentation? Explain different types of placentation.

Ans. Placentation:

It is the manner in which placentae are distributed in the ovary. Placenta is the point of attachment of ovules (or future seed) to the ovary.

Types of placentation:

- (i) Marginal: The ovary is one chambered and ovules are arranged along the margin of the ovary, e.g. pea, gram.
- (ii) Axile: Ovary is many chambered and ovules present on the placenta develop from the central axis of ovary e.g. China rose, tomato, bhindi,
- (iii) Parietal: Ovary is one chambered and ovules are attached in its inner wall where margin of adjoining carpels meet e.g. mustard, cucumber,
- (iv) Basal: Ovary is one chambered and placenta develops at the base of ovary and bears a single ovule e.g. sunflower.
- (v) Free central gynoecium is syncarpous and polycarpellary but unilolucar as septae are absent. In the central part the placenta bears many ovules e.g. Dianthus, Primula.
- (vi) Supericial: Ovary is polycarpellary syncarpous ane multilocular in which entire inner walls of chambers are lined wit placental tissue so that ovules develop all around e.g., water li (Nymphaea).

2.Explain the internal structure of leaf.

Ans. (A) General features:

(1) Leaves of most dicot plants are dorsiventral (oriented horizontally, with differentiated mesophyll) dorsiventral those of monocots are undifferentiated). Isobilateral (oriented vertically, mesophyll

(ii) V.S. of leaf shows three main parts:

(a) Epidermis, (b) Mesophyll, (c) Vascular system.

(a) Epidermis: Present on both upper and lower surface of leaf. Some epidermal cells give rise to guard cells that get arranged to form openings called stomata which help in exchange of gases for photosynthesis, respiration and evaporation of water vapour during transpiration.

In some monocot leaves, some epidermal cells in upper epidermis become enlarged to form bulliform cells which lose water so that leaves become tubular to reduce transpiration on hot sunny days.

- (b) Mesophyll: Consists of chloroplast containing parenchyma vital (chlorenchyma) and is responsible for carrying out photosynthesis. It is differentiated into palisade and spongy cells in dicot leaves. In monocot leaves, palisade tissue is lacking, thus, mesophyll has only spongy tissue.

Seed

(iii) Palisade cells: occur below upper epidermis in dicot leaf.

- (a) Cells are radially elongated, compactly arranged.
- (b) Possess abundant chloroplasts.

(iv) Spongy cells: Occur below the palisade cells in a dicot leaf.

- (a) Cells irregular and loosely arranged-Contain fewer chloroplasts.
- (b) Store gases in the inter cellular spaces.

(iii) Vascular Bundles: They are conjoint, collateral and closed.

- (a) In each bundle, xylem is located on upper side (ventral) and phloem on lower side (dorsal).
- (b) Most vascular bundles are surrounded by colourless parenchyma called bundle sheath or border parenchyma.

3. Describe C<sub>4</sub> cycle or Hatch and Slack cycle.

Ans. C<sub>4</sub> Cycle (or Hatch and Slack Cycle)

- (i) The C<sub>4</sub> cycle seems to be an adaptation for plants growing under dry hot environment. Such plants can photosynthesise even in the conditions of very low CO<sub>2</sub> concentration and under partial closure of stomata
  - (ii) Such plants can thus grow at low water content, high temperature and high light intensity. Sugar cane, maize are some such plants.
  - (iii) Photorespiration (oxidation of RuBP in presence of O<sub>2</sub> is absent in these plants. So the photosynthetic rate is high.
  - (iv) The leaves of C<sub>4</sub> plants show special anatomy called Kranz anatomy. These are:
    - (a) The vascular bundles have a sheath of large parenchyma cells around them in the form of a wreath thus the name Kranz anatomy (Kranz: wreath)
- (c) Leaves possess two types of chloroplasts (dimorphic chloroplasts).  
© Chloroplasts in the mesophyll cells are smaller and have well development grana but do not accumulate starch.
- (d) Chloroplasts in the bundle sheath cells are larger and lack grana (agranal chloroplasts) but contain numerous starch grains.

In C<sub>4</sub> plants, the initial acceptor of CO<sub>2</sub> is phosphoenol pyruvic acid or pep, a 3-carbon compound. It combines with CO<sub>2</sub> in presence of an enzyme Phosphoenol pyruvate carboxylase (PEPCase) and forms a C<sub>4</sub> acid, oxaloacetic acid (OAA). This fixation of CO<sub>2</sub> occurs in the cytosol the mesophyll cells of the leaf. OAA is the first stable product of this cycle and hence the name C<sub>4</sub> pathway. OAA then travels from mesophyll cells to the chloroplasts of bundle sheath cell where it releases the fixed C\*O\_{2} C\_{3} cycle operates within these cells and this C\*O\_{2} immediately combines with RuBP and C, cycle continues producing sugars.

Thus in C<sub>4</sub> pathway of dark reaction, there two carboxylase enzymes that take part-PEP Case in the mesophyll cells and Rubisco in the bundle sheath cells.

4.What do you understand by R.Q.? Describe it.

Ans. For carbohydrates, CO<sub>2</sub>/O<sub>2</sub>= 1 as in stem and roots.

For protein, CO<sub>2</sub>/O<sub>2</sub> <1 as in protein rich seeds like pulses.

For fat and oils CO<sub>2</sub>/O<sub>2</sub> > 1 as in oil containing seeds e.g. mustard.

As for fats RQ > 1 more energy is released per mol of fat than per mol of glucose

5.. What is genetic code? Describe its properties.

Ans. The information for the synthesis of proteins is present in the DNA in a sequence of nucleotides. This coded information wa discovered by Nirenberg, Mathair and Ochoa.

The genetic code refers to the information for the structure of a particular protein to be synthesised coded in a DNA molecule. That genefragment of DNA which carries the code for synthesis of a complete polypeptide (protein) is termed a cistron.

The genetic code has the following characteristic:

- (i) Genetic code is a triplet code. This means that sequence of 3 bases called codon in the gene has the information of a particular amino acid. The codons determine for the sequence of amino acids in a protein.
- (ii) Genetic code is unambiguous, that is a particular codon can code for only one certain amino acid.
- (iii) Genetic code is commaless and nonoverlapping. This means that it is read continuously from beginning to end.
- (iv) Genetic code is degenerate. There are 20 amino acids only that the form the various proteins of living beings. But if 3 out of 4 nucleotides (each containing one of the

four bases) from a codon, there can be  $4 \times 4 \times 4 = 64$  codons. Hence more than one codon codes for a particular amino acid. The first two bases of the codons for the same amino acid are common and the third one changes or wobbles, This is called wobble hypothesis

- (v) The genetic code is read from mRNA during protein synthesis.
- (vi) AUG codon, codes for Methionine and is the initiation codon as it is the first one to be transcribed from a cistron.
- (vii) UAA, UAG and UGA are stop codons and anticodons one of these three codons is present at the end of every cistron to terminate protein synthesis.
- (viii) Genetic code is universal and common for almost all organisms on earth.

6. What is roughage ? What are its functions?

Ans. Roughage is the fibre present in some food items like fruits and vegetables. Though roughage is not a food, it forms an important part of our diet. Roughage consists mainly of cellulose.

Functions

- (i) It helps in bowel movement.
- (ii) It cleans our digestive tracts and protects from digestive ailments.
- (iii) It prevents constipation.
- (iv) It helps in retaining water in the body.
- (v) It helps in maintaining optimum levels of blood sugar and cholesterol.

7. Explain the secondary growth in dicot roots.

Ans. The roots grow in length with the help of apical meristem. It is called primary growth. Apart from primary growth, roots grow in width i.e., they increase in girth.

This increase is called secondary growth. It is found only in dicot roots. The tissues involved in secondary growth-are lateral meristems that is vascular cambium and cork cambium.

It is important to remember that the vascular cambium and cork cambium are secondary in origin and arise from the pericycle.

8. Give the mechanism of working of eye.

Ans. Transmission of light: Reflected light rays from the object enter the eyes through the transparent structures of the eye i.e. conjunctiva, cornea, aqueous humour, lens and vitreous humour.

Formation of image: The curvature of the cornea bends the rays to some extent and the lens bends them further to form an image on the retina.

Nature of image: The image is inverted and real. Production of nerve impulse and its transmission: The light energy of the image produces chemical changes in the sensory cells (rods and cones). These changes produce nerve impulses, which travel through the optic nerve and reach the brain. Perception: The brain interprets the image in many ways: e.g. it sees the object vertical although the actual image formed is inverted. Accommodation (focusing): Focusing the image on retina is called accommodation. Changing the curvature of the elastic lens brings about the accommodation.

- (i) For distant vision: The lens is more flattened or thinner; this is the normal condition of the lens, which is kept stretched by the suspensory ligaments.
- (ii) For near vision: The ciliary muscles which are circular, contract and tend to reduce the circumference of the eyeball there. This body releases the tension on the suspensory ligament and the lens becomes thicker (more rounded) on account of its own elasticity.

9. Write an essay on population control and family planning, st Ans. It is very necessary to control the overgrowing population. It is necessary to educate people to accept small family norms and create awareness about population explosion and its impact on the family, society and the nation. The government has taken many measures for providing family planning guidance and support and family welfare measures.

There are various ways to prevent fertilization and hence to check the increase of population. Some of these are discussed here.

Education: The most effective method for control of population is to impart education to the masses about the consequences of population explosion and various ways of fertility control. Education helps to make people aware of the advantages of a small family and the disadvantages of a large family. Preventive methods for population control and family planning: following are some methods of birth control:

- (i) Rhythm method: The period in the menstrual cycle before

Ovulation phase is termed 'safe period' as no egg is available for fertilization by the sperm. This method, however, is not reliable.

- (ii) Use of condoms in males and diaphragms in females prevent sperms from meeting the ovulated eggs.
- (iii) Intrauterine devices such as copper T are inserted in the female body so that implantation is not possible. This method requires advice and help from the medical doctor.

- (iv) Oral contraceptive pills are tablets which have to be taken as per directions from a medical practitioner. These pills interfere with ovulation and in turn prevent fertilization.
- (v) Vasectomy and Tubectomy are surgical methods. In males, the Vas deferens through which sperms travel out of epididymis is ligated (tied) by the surgeon to prevent sperms from going out of the body. This method is temporary and can be reversed by the surgeon if required. For permanently preventing fertilization the vas deferens is cut and the open ends ligatured (tied by thread). Tubectomy is sterilization of the woman by cutting fallopian tubes and ligaturing them so that ovulated egg cannot pass down for fertilization.

In case preventive measures fail or if the foetus is found to have a defect, the foetus may have to be aborted.

Abortion or Medical Termination of Pregnancy (MTP) is to remove the unwanted foetus from the mother's body. However, it is advised to always seek professional medical help for MTP.

10. Give the botanical names of following

- (i) Rice
- (ii) Wheat
- (iii) Maize
- (iv) Sugarcane
- (v) Bamboo
- (vi) Barley

Ans. (i) Rice – *Oryza sativa*

- (iii) Wheat-Triticum aestivum
- (iv) Maize – *Zea mays*
- (v) Sugarcane – *Saccharum officinarum*
- (vi) Bamboo *Bambusa sp*
- (vii) Barley – *Hordeum vulgare*

11.. Describe test tube babies.

Ans. Some women their oviducts (Fallopian tubes) get blocked. This prevents the ova from being fertilized. This problem can be overcome by the test tube baby technique. In this technique, one or more ripe ova are sucked from a woman's ovaries using a special syringe. These ova are placed in a dish containing sperms from her male partner under optimum conditions for a few hours. Sperms fertilize the ova which form an embryo. One embryo is then inserted into the woman's uterus where there is a chance it will implant and develop into a baby.

12.who caused the disease cholerae?Ans. Vibrio cholerae

13.what is the voice box in birds called?

Ans. Syrinx

14.which part of seed form root?

Ans.Radicle

15.Name of the type of root modification found in marshy areas

Ans. Pneumatophores

16. Define bark.

Ans. All the dead cells present outside the active phellogen.