

**Meghalaya Board**  
**Class XII**  
**Bio-Botany**  
**Sample Paper 2 – Solution**

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**GROUP A**

1. Plants, animals and bacteria are producers, consumers and decomposers in an ecosystem.
2. The main function of National Bureau of Plant Animal and Fish Genetic Resources is to collect and conserve the germplasm of plants and animals in seed gene banks and field gene banks.
3. The pollen grains can be cryopreserved (storing in liquid nitrogen at  $-196^{\circ}\text{C}$ .)
4. Some plants have a mechanism of shedding of pollen before the maturation of stigma to prevent self-pollination.
5. In primary succession on rocks, the pioneer species invade a bare area and give way for other species to grow.
6. 50,000 strains of rice represent species biodiversity because the strains represent variety of species and their relative abundance.

**GROUP – B**

7. Even though each pollen grain has two male gametes, atleast 10 pollen grains required to fertilise 10 ovules present in a particular carpel instead of 5 pollen grains because only one male gamete is involved in syngamy or the fusion of male gamete with the egg cell.

**Or**

Cross-pollinating flowers develop the following strategies to prevent self pollination:

1. Protogyny (when gynoecium matures earlier than androecium) or Protandry (when androecium matures and sheds pollen before maturation of gynoecium)
2. Self incompatibility

8. The cross between two individuals of different species of the same genus is called interspecific hybridisation.

Resistance to yellow mosaic virus in Okra plant (*Abelmoschus esculentus*) was transferred from a wild species and resulted in a new variety of *Abelmoschus esculentus* called *Prathani Kranti*.

One advantage is that a disease-resistant variety is obtained.

9.

First trophic level of detritus food chain	First trophic level of grazing food chain
Decomposers are the first trophic level.	Producers are the first trophic level.
They break down complex organic matter into a simpler form by secreting enzymes.	They prepare complex organic molecules from simple organic material by using sunlight.

10. The ecological importance of biodiversity are-

- (a) Biodiversity is required for maintaining and sustainable use of goods and services from ecosystem.
- (b) Various insects help in pollination.
- (c) Various micro-organisms help in the decomposition of organic matter thereby increasing the soil fertility.
- (d) Various drugs and medicines are extracted from plants.

#### GROUP - C

11. The species that have been introduced from another geographic region to an area outside its natural range are called alien species or exotic species. For example

(i) Parthenium, Lantana and Eicchornia are the alien species of plants that have invaded the native species of India and caused environmental damage.

(ii) Introduction of African catfish *Clarias gariepinus* for aquaculture purpose is posing threat to many indigenous catfish.

(iii) Nile perch introduced into Lake Victoria in East Africa led to the extinction of cichlid fish.

- 12.** If the rate of reproduction of phytoplankton slows down, then the net primary productivity decreases. As a result, the flow of energy will also decrease in the successive trophic level. The two factors which cause a reduction in phytoplankton reproduction are
- (a) Less water availability
  - (b) Less nutrient availability

**Or**

The pyramid of biomass in a pond is generally inverted because the biomass of fish exceeds that of phytoplankton and the number of big fish eating the small fish is also greater than the small ones.

Also, in the pyramid of numbers, the number of insects feeding on a big tree is far greater than the tree. Now the number of small birds depending on the insects and the number of larger birds eating the smaller ones also increases in the order.

- 13.** As the anther develops, the cells of the sporogenous tissue undergo meiotic divisions to form microspore tetrads. As each cell of the sporogenous tissue is capable of giving rise to a microspore tetrad, each one is a potential pollen or microspore mother cell. The process of formation of microspores from a pollen mother cell (PMC) through meiosis is called microsporogenesis. As the anthers mature and dehydrate, the microspores dissociate from each other and develop into pollen grains. Inside each microsporangium, several thousands of microspores or pollen grains are formed that are released with the dehiscence of the anther.

#### **GROUP - D**

- 14.** Ovary wall: Pericarp  
Ovule: Seed  
Zygote: Embryo  
Outer integument: Testa  
Inner integument: Tegmen  
Primary endosperm nucleus: Endosperm

**Or**

- (i) Endosperm is the food laden tissue formed during the development of angiospermous seed which provides essential nutrients to the growing embryo and also the young seedling at the time of seed germination. So, most zygotes in angiosperms divide only after certain amount of endosperm is formed.

- (ii) The seeds in which the endosperm is used up are called exalbuminous seeds. In groundnut, the endosperm is used and the reserve food material is stored in cotyledons. So, groundnut seeds are exalbuminous. The seeds having ample amount of endosperm tissue are called albuminous seeds. Castor seeds have persistent endosperm. So, castor seeds are albuminous.
- (iii) Double fertilisation in angiosperms brings about some changes in the ovule during the development of seed. The micropyle remains in the form of a fine pore on the surface of seed to allow the entry of water during seed germination.
- (iv) Integuments of an ovule harden and the water content is highly reduced as the seed matures to ensure the survival of seeds.
- 15.** The process of fusion of protoplasts of somatic cells obtained from different varieties or species of plant on a suitable nutrient medium *in vitro* to develop a somatic hybrid is called somatic hybridisation. Various steps involved in somatic hybridisation are
- (i) Single cells are isolated from a single plant.
  - (ii) The cell walls are digested by enzymes such as pectinase and cellulose to liberate the protoplasts.
  - (iii) Naked protoplasts surrounded only by plasma membranes are isolated.
  - (iv) The isolated protoplasts are fused to obtain hybrid protoplasts under sterile conditions in a nutrient medium.
  - (v) The hybrid protoplasts are cultured in a suitable media to form new plants.
- Two uses of somatic hybridisation are
- (i) Somatic hybrids may be produced.
  - (ii) Healthy plants can be recovered from diseased plants.
- 16.** An algal bloom is a rapid increase or accumulation in the population of algae (typically microscopic) in an aquatic system. Algal blooms may occur in freshwater or marine environments. The fertility of a lake in an industrial area increases with inorganic chemicals and sewage, causing an increase of primary productivity and leading to an increased growth of algae. The decomposition of algae leads to reduction in oxygen quantity and death of aquatic life. This excessive richness of nutrients in a lake or other body of water, frequently due to run-off from the land, causes a dense growth of plant life called eutrophication.