

**Meghalaya Board**  
**Class XII**  
**Bio-Botany**  
**Sample Paper 1 – Solution**

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**GROUP A**

1. Zygote is formed by syngamy, so it is diploid in nature, and primary endosperm nucleus is formed by the fusion of secondary diploid nucleus with one of the male gamete, so it is triploid in nature.
2. It is important for breeding disease-resistant plant varieties.
3. *Spirulina* are grown on a large scale to serve as a good source of protein called single cell protein. It also serves as food rich in minerals, vitamins, fats and carbohydrates.
4. In a food chain, about 80-90% of energy available with a trophic level is lost during its transfer from one trophic level to the next, so the amount of energy available decreases.
5. The rate of succession is much faster in secondary succession as the soil is already present as compared to primary succession where the process starts from a bare area.
6. The hotspots of India that extend into other countries are Western Ghats- Sri Lanka and Indo-Burma-Himalayas.

**GROUP – B**

7. Ex situ is a desirable approach to protect the wild cat. The organism is protected outside their natural habitat where special care is taken to protect them.  
By using cryopreservation techniques, gametes of threatened species can be preserved under very low temperature.

**Or**

The scientific management and preservation of flora and fauna in its natural form is called biodiversity conservation. There are two types of conservation strategies: in situ conservation, which is the protection of species in their natural habitat (national parks), and ex situ conservation, which is the protection of species in an artificially created habitat (botanical garden).

8. Each microsporangium has 100 microspore mother cells which form 400 microspores by meiosis ( $100 \times 4$ ).  
In an anther, there are four microsporangia. So, the total number of microspores will be  $4 \times 400 = 1600$ .  
As each microspore forms one male gametophyte, 1600 male gametophytes can be produced.
9. The process of mating more closely related plants within the same breed is called inbreeding.  
The recessive alleles become homozygous and express themselves. These are then eliminated by selection.
10. The vertical distribution of different species occupying different levels in an ecosystem is called stratification. Trees occupy the topmost vertical layer of a forest, shrubs occupy the second layer and herbs and grasses occupy the bottommost or base layers.

**GROUP - C**

11. Primary productivity is referred to as the amount of biomass or organic matter produced per unit area over a time period by the plants during photosynthesis. It is the weight of the organic matter stored by the producers in a unit area volume per unit time. Net primary productivity is equal to the rate of organic matter produced by photosynthesis minus the rate of respiration and other losses.  
It is represented as  $NPP = GPP - R$
12. When the female gametophyte (embryo sac) develops from a single megaspore, it is called monosporic development.  
Usually, in most angiosperms, the megaspore mother cell divides by meiosis to form four haploid megaspores arranged in a linear fashion. The three haploid megaspores situated towards the micropyle degenerate, while one remains functional which develops into the female gametophyte.

**Or**

Microsporogenesis: Process of formation of microspore from the pollen mother cell.

Megasporogenesis: Process of formation of megaspore from megaspore mother cell.

Meiotic division occurs in both the events.

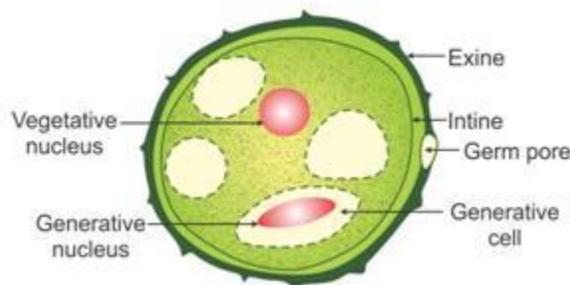
Microsporogenesis results in the formation of pollen grains, while megasporogenesis results in the formation of megaspores.

- 13.** The explant from the plant is grown in a culture medium which is rich in inorganic nutrient, vitamins and growth regulators such as auxins and cytokinins. This method of producing plants through tissue culture is called micropropagation.

The plants produced from the original plant are genetically identical, so they are called somaclones.

**GROUP - D**

- 14.** Structure of mature pollen grains in angiosperms.



Functions of the parts of pollen grain: A mature pollen grain has a two-layered wall—the outer exine and inner intine. The wall encloses a large vegetative cell containing vegetative nucleus and a lenticular generative cell. Their functions are as follows:

1. Exine: The outer thick exine layer is made up of sporopollenin which is resistant to physical and biological decomposition. It provides protection during the hazardous journey of pollen from the anther to stigma. There are one or many germ pores on the pollen surface which are directly or indirectly associated with its germination.
2. Intine: The intine is pecto-cellulosic in nature. It is associated with the formation of the pollen tube.
3. Vegetative cell: The vegetative cell is large and contains abundant food reserve. It has a large vegetative nucleus. The function of the vegetative cell is to provide the medium for the movement of male gametes inside the pollen tube.
4. Generative cell: The generative cell cytoplasm is highly reduced but it contains the usual cell organelles. It divides mitotically to produce two functional male gametes.

Or

Seeds contain food to nourish the embryo during germination and possess better adaptive strategies for dispersal to new habitats. These are formed by sexual reproduction with new variations and better genetic combinations. So, the seeds are advantageous to flowering plants.

- 15.** Biofortification is the technology which has helped in improving public nutritional health by breeding crops with higher levels of vitamins and minerals or higher protein and healthier fats. In biofortification, protein, oil, vitamin, micronutrient and mineral content and their qualities are improved. For example,
- (a) Maize hybrids with more quantity of amino acids such as lysine and tryptophan were developed.
  - (b) To increase wheat cultivation, an improved variety, Atlas 66, has been used as the donor for having a high protein content.
- 16.** Decomposition of detritus is slow if it contains lignin, chitin, tannins and cellulose, whereas it is quick if detritus is made up of nitrogenous compounds and water-soluble substances like sugars. This is because the latter are easy to degrade. Oxygen is required for the activity of decomposers and detritivores. Therefore a reduced oxygen amount will slow down the process of decomposition.