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Date: 02/09/2022

Subject: BOTANY

Topic : PLANT KINGDOM L7

Class: Standard XI

Instructions:

A

1. All vascular plant groups show similarity in

- ☐ A. having a dominant gametophyte phase
- ☐ B. producing motile male gametes
- ☐ C. requirement of water for gamete transfer
- ☒ D. having an independent sporophyte

Vascular plants include pteridophytes, gymnosperms and angiosperms. Apart from having the vascular tissue in common, all these plants exhibit similarity in having an independent and dominant sporophyte.

Pteridophytes have an independent gametophytic phase but it is not the dominant phase of the life cycle.

Gymnosperms and angiosperms have highly reduced gametophytes, that are dependent upon sporophyte.

Male gametes are motile in pteridophytes and few gymnosperms like *Cycas* and *Ginkgo*. In angiosperms, male gametes are non motile and are carried to the female gamete by the pollen tube. Water is required for gamete transfer in pteridophytes. In aquatic angiosperms (hydrophytes), water is used as a medium of transfer of the pollen grains (consisting of male gametophyte) to the stigma (pollen grain receptor) of the flower. The pollen grains carry the two male gametes in them. In gymnosperms and the majority of the angiosperms, pollen grain transfer is either by wind or some animals.

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2. The phenomenon of double fertilization:

- ☒ A. involves the formation of an embryo only
- ☒ B. involves the formation of an endosperm only
- ☒ C. is a characteristic feature of gymnosperms
- ☒ D. involves five nuclei

Double fertilization is a characteristic feature of angiosperms. It includes both syngamy and triple fusion.

Syngamy: Fusion of a male gamete with a female gamete to form a zygote that in turn develops into an embryo.

Triple fusion: Fusion of one male gamete with the diploid secondary nucleus (formed by fusion of two haploid polar nuclei) results in the formation of triploid primary endosperm nucleus (PEN). PEN divides and forms the triploid nutritive tissue, endosperm.

Hence, five nuclei are involved in double fertilisation. Two nuclei of male gametes, two polar nuclei and one nucleus of egg.

In case of fertilization in gymnosperms, only fusion of male gamete and female gamete happens, unlike angiosperms. There is no event of triple fusion taking place here and the endosperm formed is haploid.

3. The image given below is of _____.



- ☒ A. *Cycas*
- ☒ B. *Pinus*
- ☒ C. *Ginkgo*
- ☒ D. *Selaginella*

The plant shown in the image is a gymnosperm, *Ginkgo*. *Ginkgo* is considered to be a living fossil. Living fossils are organisms that have not undergone any change from the time of their origin and closely resemble organisms that are known otherwise from the fossil record. The relatives of these plants are extinct.

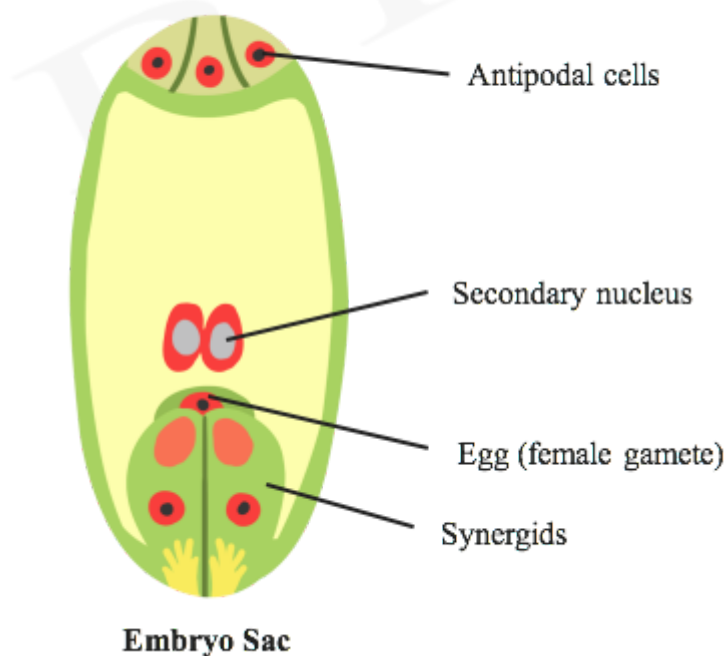
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4. Which among the following is not a haploid structure in angiosperms?

- ☒ A. Antipodals
- ☒ B. Endosperm
- ☒ C. Egg
- ☒ D. Synergid

Endosperm in angiosperms is triploid ($3n$) since it is formed by the fusion of three nuclei. Fusion of one male gamete (n) with the diploid secondary nucleus ($2n$) (formed by fusion of two haploid polar nuclei) results in the formation of triploid ($3n$) primary endosperm nucleus (PEN). PEN divides and develops into a triploid nutritive tissue, the endosperm.

The embryo sac represents the female gametophyte in angiosperms. The embryo sac is formed from the haploid megaspore. Hence all the cells inside the embryo sac are haploid. It is a 7 celled structure. Three antipodals, two synergids, one egg cell and one large central cell.



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5. A gametophyte dependent on sporophyte is found in

- ☒ A. *Hibiscus*
- ☐ B. *Polytrichum*
- ☐ C. *Marchantia*
- ☐ D. *Pteris*

A gametophyte dependent upon sporophyte is found in gymnosperms and angiosperms. *Hibiscus* is a flowering plant (angiosperm).

Polytrichum, *Marchantia* are bryophytes in which the sporophyte is dependent upon gametophyte as the sporophytic generation is not photosynthetic in nature and depends on the gametophyte for its nourishment. It is therefore dependent or parasitic on the gametophyte.

Pteris is a pteridophyte, in which both sporophyte and gametophyte phases are independent of each other.

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6. The tallest tree in the world belongs to _____ genus and division of _____.

- ☐ A. *Sequoia*, angiosperms
- ☐ B. *Eucalyptus*, gymnosperms
- ☒ C. *Sequoia*, gymnosperms
- ☐ D. *Eucalyptus*, angiosperms

Sequoia is considered to be the tallest tree. It belongs to gymnosperms.



7. Angiosperms are classified based on the

- ☐ A. mode of pollination
- ☒ B. number of cotyledons
- ☐ C. mode of gametogenesis
- ☐ D. mode of fertilisation

Angiosperms are classified into dicots and monocots. This classification is done on the basis of the number of cotyledons in the seed. The cotyledons contain the stored food reserves of the seed. Dicots have two cotyledons in the seed and monocots have a single cotyledon.

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8. Flowers aid in

- ☐ A. asexual reproduction
- ☒ B. sexual reproduction
- ☐ C. both asexual and sexual reproduction
- ☐ D. vegetative propagation

Flowers aid in sexual reproduction. Sexual reproduction involves the fusion of male and female gametes. Male gametes are produced inside the anther of the flower. Female gametes are produced inside the carpel of flowers.

9. The egg apparatus inside the embryo sac in angiosperms is

- ☐ A. two celled
- ☒ B. three celled
- ☐ C. seven celled
- ☐ D. one celled

The egg apparatus, which is three celled, includes two synergids and an egg. It is present near the micropylar end of embryo sac (opening of the ovule).

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10. The embryo sac in angiosperms is _____ celled and _____ nucleated structure.

- ☒ A. seven and eight
- ☐ B. eight and seven
- ☐ C. four and five
- ☐ D. two and three

Embryo sac in angiosperms is seven celled and eight nucleated structure. This includes three antipodals, two synergids, one egg and a large central cell. The large central cell has two nuclei (diploid secondary nucleus). Rest of the cells have one nucleus each.