

TEACHERS FORUM[®]



QUESTION BANK

(SOLVED)

KERALA STATE

+2 BIOLOGY

(BOTANY & ZOOLOGY)

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1

SEXUAL REPRODUCTION IN FLOWERING PLANTS

PREVIOUS YEARS' QUESTIONS AND ANSWERS

1. Synergids have special cellular thickening at micropylar tip.

Write the name and function of this structure

(2018)

Ans. Filiform apparatus. Guiding Pollen tube into the Synergid

2. In angiosperms female gametophyte is known as embryo sac. Explain it's development. (2018)

Ans. First cell of female gametophyte - Functional megaspore.

Nucleus of megaspore divides free mitotically by three times and form 8 nucleate embryosac. Four nuclei at micropylar end and four at chalazal end.

3. A date palm seed discovered during archaeological investigation retained viability even after 10,000 years. The retention of viability is due to the state of inactivity of embryo called _____ (2017)

Ans. Dormancy.

4. When the pollen is transferred from another to the stigma of the same flower, the pollination is called autogamy.

(a) Cleistogamous flowers are invariably autogamous .Explain.

(b) Geitonogamy is functionally cross pollination, but genetically similar to autogamy. Justify statement . (2017)

Ans. (a) Flowers do not open at all, the anthers and stigma lie close to each other, when the anther dehisce in the flower buds pollen grains come in contact with the stigma, there is no chance of cross -pollen landing on the stigma

(b) Geitonogamy is functionally cross pollination by pollinating agent/pollination between different flowers of the same plant.

Genetically similar to autogamy - because pollen grains come from the same plant/ pollination between different flowers of the same plant.

5. The thick protective covering of the fruit is known as _____ (2017)

Ans. Pericarp/Any wall layer of pericarp.

6. In some seeds the nucleus may be persistent. Such nucleus is called

(a) Endosperm (b) Scutellum (c) Plumule (d) Perisperm (2016)

Ans. (d) Perisperm

7. What is a false fruit? Cite an example . (2016)

Ans. Fruit developed from any other part other than ovary

eg : False fruit of Apple, False fruit of cashew nut.

8. Many of the flowering plants have developed some devices for discouraging in breeding. Write any two of them **(2016)**

Ans. (a) Dicliny (Unisexuality)

Non synchronous pollen release and stigma receptivity (Dichogamy or protandry and protogyny)

(b) difference in orientation and stamen and stigma (herkogamy)

(c) Heterostyly – dimorphic flower

(d) Self incompatibility (self sterility)

(e) Pollen prepotency- Preference of foreign pollengrain than its own pollen grain.

9. A unisexual flower having no androecium is called

(a) Ditheous

(b) Dioecious

(c) Monoecious

(d) Pistillate

(2016)

Ans. Pistillate

10. The development of pollen grains in Angiosperms is called

(a) Microsporogenesis

(b) Embryogenesis

(c) Megasporogenesis

(d) Gametogenesis

(2016)

Ans. (a) Microsporogenesis

11. Which of the following part in a flower is haploid?

(a) Antherwall

(b) Pollen mother cell

(c) Synergid

(d) Secondary nucleus

(2016)

Ans. (c) Synergid

12. In aquatic plants like water hyacinth and water Lilly the pollinating agent is

(a) Wind and insect

(b) Water

(c) Birds and butterflies

(d) Aquatic organisms

(2016)

Ans. (a) Wind and insect.

13. The hard outer layer of pollen is composed of

(a) Exine

(b) Intine

(c) Integument

(d) Sporopollenin

(2016)

Ans. (d) Sporopollenin

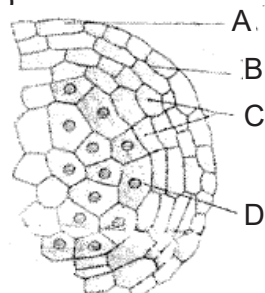
14. Observe the following diagram and label A, B, C and D

Ans. (a) Epidermis

(b) Endothecium

(c) Middle layers

(d) Tapetum



(2016)

Sexual Reproduction in Flowering Plants

15. The chromosome number of onion is 16 ($2n$). Find the chromosome number in the following cells: (a) Endosperm cell (b) Zygote **(2015)**

Ans. (a) 24 (b) 16

16. You are supplied with three different flowers such as Maize, Vallisneria and Rose and they have different pollinating agents also.

(a) Differentiate the type of pollination.

(b) Write their various adaptability in the plants suited to pollination. **(2015)**

Ans. (a) Maize-wind pollination Vallisneria-water pollination

Rose-insect pollination

In maize pollen grains are produced in large quantity, small flowers are packed into inflorescence, and stamen and stigma are exposed.

In vallisneria pollen grains are non sticky and surrounded by mucilaginous layer to prevent from wetting. They have not produced nectar and scent. In rose pollen grains are sticky and produced strong scent, the flowers are brightly coloured, it attract insect for pollination.

17. Multiple Choice Question. Development of fruit without fertilization and are seedless known as

(a) Polyembryony (b) Apomixis (c) Parthenocarpy (d) Parthenogenesis **(2015)**

Ans. (c) Parthenocarpy

18. (a) Reeja a science student observed the structure of mature embryo sac comprising antipodals, central cells and egg apparatus. Explain each one of them. **(2015)**

Ans. The typical female gametophyte or embryo sac is 8-nucleate and 7-celled.

2 polar nuclei are situated below the egg apparatus in the large central cell.

Three cells are grouped together at the micropylar end and constitute the egg apparatus. The egg apparatus consists of two synergids and one egg cell. The synergids have special cellular thickenings at the micropylar tip called filiform apparatus, which play an important role in guiding the pollen tubes into the synergid.

Three cells are at the chalazal end and are called the antipodals.

19. In flowering plants during double fertilization two events take place in the embryo sac namely _____ and _____ **(2014)**

Ans. Syngamy, triple fusion.

20. From the following, select the two having haploid chromosome number.

(a) Egg (b) endosperm (c) Zygote (d) Pollen **(2014)**

Ans. egg, pollen

21. Sunflower is pollinated by insects while rice is pollinated by wind.

(a) How these plants are adapted to their respective type of pollination method?

(b) Plants can be self or cross pollinated. Write any two mechanisms existing in nature to promote cross pollination. (2014)

Ans. (a) Insect pollination

1. Large, coloured flower
2. Strong smell of flowers
3. Produce nectar and rewards for the pollinator.
4. Small and non-sticky pollen grains.

Wind pollination.

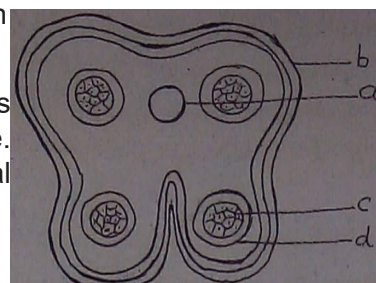
1. Large and feathery stigma
2. Small & nonsticky pollen grains .
3. Doesn't produce nectar
4. Each ovary & contains single ovule.
5. Large no. of pollen grains are produced.

(b) 1. Production of unisexual flower

2. Stigma of pollen are placed in different position.
3. Prevent synchronization of stigma receptivity of pollen release.

22. (a) The diagram given below shows the transverse section of a young anther. Identify the parts a, b, c and d.

(b) The developmental stages of male gametes in plants consist of microsporogenesis and male gametophyte. Arrange the following terms in their correct developmental sequence.



pollen grain Sporogenous tissue anther
microspore tetrad pollen mother cell male gamete.

(2014)

Ans. (a) 1. Connective tissue 2. Epidermis
3. Sporogenous tissue 4. Tapetum

(b) Anther → sporogenous tissue → pollen mother cell → micro-spore tetrad → pollen grain → male gamete.

23. Flowering plants evolved an array of adaptations to achieve pollination.

(a) Explain pollination.

(b) Point out adaptations found in flowers for insect pollination and wind pollination.

(c) Illustrate pollination in Vallisnaria.

(2013)

Ans. (a) Transfer of pollen grains from anther to stigma of flower.

(b). Insect pollination:

- * Large attractive flower
- * Presence of nectar.
- * Sticky pollen grains.
- * Odour
- * Small flowers in to an inflorescence.

Wind pollination

Sexual Reproduction in Flowering Plants

- Light (weightless) pollen grains.
- Large-quantity of pollen grains.
- Well exposed stamen.
- Feathery stigma
- Small clustered flowers.

(c) Female flowers reach surface of water by long stalk, pollen grains are released to the surface of water, by water current pollination takes place. Pollination: Hydrophily

24. Artificial hybridization is one of the major approaches for crop improvement programme. In such crosses it is important to avoid unwanted pollen.

(a) Explain how can we protect stigma from unwanted pollen

(b) How artificial pollination can be performed?

(2013)

Ans. (a) Emasculation and Bagging

(b) 1. Emasculation: removal of anthers from a flower.

2. Bagging: covering emasculated flower using a paper cover to prevent unwanted pollination

3. Cross pollination: using a brush pollen grains from selected flower is taken and tapped on stigma of emasculated flower

4. Re bagging

Additional Questions and Answers

1. Apple and mango are fruits. But they are formed in different ways. How are they formed?

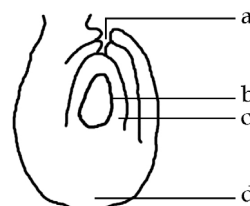
Ans. • Apple is a false fruit, thalamus also contributes to fruit formation

• Mango is a true fruit, formed entirely from the ovary

2. Observe the figure given below. Label the parts a, b, c and d.

Ans. (a) Micropyle (b) Embryo sac

(c) Nucellus (d) Chalaza/chalazal pole



3. The embryo sac development in majority of flowering plants is monosporic development. Explain this type of embryo sac development.

Ans. • A single megaspore mother cell (MMC) of the nucellus differentiates in the ovule.

• MMC undergoes meiosis to form four megaspores

• One megaspore becomes functional, while the other three degenerate.

• The functional megaspore develops into embryo sac.

4. The synergids have special cellular thickenings. Name the thickening and write its function.

Ans. Filiform apparatus

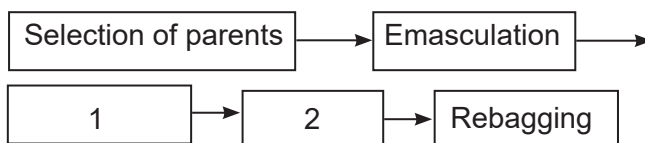
Function - Guiding the pollen tube into the synergid.

5. Self incompatibility and dioecious condition are two devices for discouraging self pollination in plants. Explain the two.

Ans. • Self incompatibility - Genetic mechanism that prevents self pollen from fertilizing the egg by inhibiting pollen germination in the pistil.

• Dioecious condition - Male and female flowers on different plants.

6. Observe the flow chart given below. Fill in the blank 1 and 2. Write the relevance of the process indicated as 1.



Ans. (1) Bagging

(2) Artificial pollination

1 - To prevent contamination of stigma with unwanted pollen

7. Choose the correctly matched pair.

- (a) Coleorrhiza - Hollow foliar structure (b) Perisperm - Remnants of nucellus
(c) Proembryo - mature embryo

Ans. (b)

8. Geitonogamy and xenogamy are two types of pollination. Differentiate between the two.

Ans. Geitonogamy - Transfer of pollen grains from the anther to the stigma of another flower of the same plant.

Xenogamy - Transfer of pollen grains from anther to the stigma of a different plant.

9. The inner most wall layer of microsporangium is tapetum. It is multinucleate. Justify this statement.

Ans. • Tapetum nourishes the developing pollen grains.

10. Peculiarities of two types of seeds are given below. Identify the two types of seeds and give example for each.

(i) Endosperm completely used by embryo.

(ii) Endosperm not completely used by embryo.

Ans. (i) Non - albuminous Eg : Pea/Groundnut

(ii) Albuminous Eg : Wheat/Maize/Barley/Castor

11. The embryo of monocotyledons and dicotyledons show differences in structure. Explain the structure of dicot embryo.

Ans. • A dicot embryo has an embryonal axis • It has two cotyledons

• The portion of embryonal axis above the level of cotyledons is the epicotyl

• This terminates in the plumule

Sexual Reproduction in Flowering Plants

- The cylindrical portion below the level of cotyledons is hypocotyl
- This terminates at its lower end in the radicle.

12. Analyse the table and fill in the blank.

A	B	C
False fruit (a)	Apple
..... (b)	Fruit developed from the ovary through fertilisation	Orange
..... (c)	Fruit developed without fertilisation (d)

Ans. (a) Thalamus also contributes to fruit formation.

(b) True fruit (c) Parthenocarpy (d) Banana

13. Occurrence of more than one embryo in a seed is called polyembryony.

(a) Give two examples of polyembryony. (b) How does polyembryony occur?

Ans. (a) Citrus and mango

- (b) • Some of the nucellar cells surrounding the embryo sac start dividing
 • They protrude into the embryo sac and develop into the embryos

14. Choose the correct answer.

The layer of microsporangium that nourishes the developing pollen grains is

(a) Endothecium (b) Tapetum (c) Middle layer (d) Epidermis

Ans. (b)

15. A typical angiosperm embryo sac at maturity is.

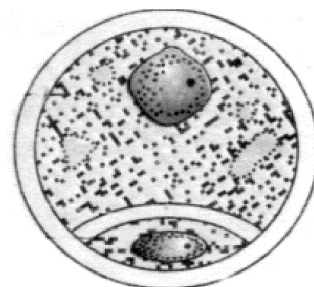
(a) 7 nucleate 8 celled (b) 8 nucleate 8 celled
 (c) 7 nucleate 7 celled (d) 8 nucleate 7 celled

Ans. (d)

16. Observe the figure given below and explain its structure.

Ans. • Pollen grain has a two layered wall.

- The hard out layer called exine.
- Exine has prominent apertures called germ pores
- The inner wall is called the intine.
- Pollen grain has two cells.
- A large vegetative cell and small generative cell.



17. The process of formation of fruits without fertilisation is called.

A. Parthenogenesis B. Parthenocarpy C. Apomixis D. Autogamy

Ans. B

18. Peculiarities of certain parts of the ovule are given below. Name the parts.

(a) Protective envelops of the ovule (b) Stalk of the ovule

(c) The layer of cells within the integuments (d) Junction between ovule and funicle

Ans. (a) Integuments (b) Funicle (c) Nucellus (d) Hilum

19. Mature pollen grain has a vegetative cell and a generative cell. Write the peculiarities of the two cells.

Ans. Vegetative cell - Bigger, Abundant food reserve, Large irregularly shaped nucleus.
Generative cell - Small, floats in the cytoplasm of vegetative cell, spindle shaped, dense cytoplasm and a nucleus.

20. Endosperm develops from the primary endosperm nucleus. Explain the process of endosperm development.

Ans. • The PEN undergoes successive nuclear divisions to give rise to free nuclei.
• Cell wall formation occurs and becomes cellular.

21. Wind is an abiotic agent that helps in pollination. Write any six features of wind pollinated flowers.

Ans. • Pollen grains are light • Non-sticky pollen grains
• Well exposed stamens • Large, feathery stigma
• Single ovule in each ovary • Numerous flowers packed into inflorescence

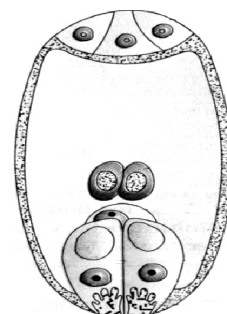
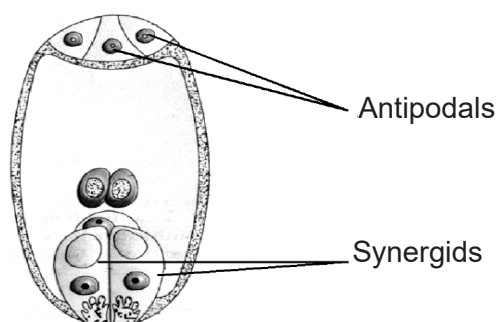
22. Geitonogamy is similar to autogamy. Justify this statement.

Ans. In autogamy pollen grains come from the same plant as in autogamy.

23. Observe the diagram given below.

(a) Copy the diagram and label antipodals and synergids.
(b) Explain double fertilisation.

Ans. (a)



(b) • One of the male gametes fuses with egg cell to form a diploid zygote.
• The other male gamete fuses with the polar nuclei to form primary endosperm nucleus (PEN)
• Thus two types of fusion occur in the embryo sac, namely syngamy and triple fusion.

24. Observe the relationship between the first two terms and fill in the blanks.

Sexual Reproduction in Flowering Plants

- (a) Exine : Sporopollenin ; Intine :
(b) Pistils fused : syncarpous ; Pistils free :
(c) Zygote : $2n$; Endosperm :

Ans. (a) Cellulose and pectin. (b) Apocarpous (c) $3n$

25. Find the odd one : Hilum, Funicle, Intine, Integuments

Ans. Intine

26. Apomixis is an asexual form of reproduction, that mimics sexual reproduction. Substantiate this statement.

Ans. • In apomixis seeds are produced without fertilisation, hence it is asexual.

• By retaining the seed habit, it is mimicing sexual reproduction.

27. There is no fertilisation process in both parthenocarpy and apomixis. How one differs from the other? Cite an example for each process?

Ans. • In parthenocarpy seedless fruits are formed without fertilisation. eg : Banana.

• In apomixis seed habit is retained, without fertilisation. eg : Asteraceae/grasses.

28. In cleistogamous plants, growing on agricultural lands that are regularly sprayed with insecticides, fertilisation and seed formation goes on undisturbed. Give one reason.

Ans. Here flowers do not open at all and are self- pollinating

29. Meiosis is an essential event in the sexual life cycle of any organism. Give two reasons.

Ans. (i) Meiosis helps in formation of gametes by reductional division & maintains number of chromosomes constant.

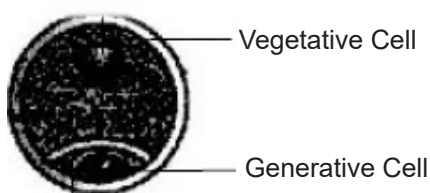
(ii) Recombination of genes in offsprings brings variation.

30. What is a cistron ?

Ans. A segment of DNA and Coding for a polypeptide

31. Draw a diagram of micropore of an angiosperm. Label its cellular components only.

Ans.



32. What is pollen –pistil interaction and how is it mediated?

Ans. It is the ability of the pistil to recognize the pollen followed by its acceptance or rejection.

It is mediated by chemical components of pollen interacting with those of pistil.

33. State the function of filiform apparatus found in mature embryo sac of an angiosperm.

Ans. Filiform apparatus helps to guide pollen tubes into synergid

34. Why is banana considered a good example of parthenocarpy?

Ans. Banana forms fruit without fertilisation.

35. Name the type of cell division that takes place in the zygote of an organism exhibiting haplontic life cycle.

Ans. Meiosis

36. Normally one embryo develops in one seed but when an orange seed is squeezed many embryos of different shapes and sizes are seen. Mention how it has happened.

Ans. Some nucellar cells surrounding the embryo sac start dividing and protrude into the embryo sac and develop into embryos. In such species each ovule contains many embryos-polyembryony.

37. An anther with malfunctioning tapetum often fails to produce viable male gametophytes. Give one reason.

Ans. Tapetum nourishes the developing male gametophytes.

38. Why are researchers the world over, trying to transfer 'apomictic' genes into hybrid seeds ? Give reasons.

Ans. Characters are preserved in hybrids.

1. There is no segregation of characters in hybrid progeny

2. Large number of individuals with same characters can be produced

39. A single pea plant in your kitchen garden produces pods with viable seeds, but the individual papaya plant does not. Explain.

Ans. Pea- flowers of pea plants are bisexual or monoecious to produce pods with viable seeds

Papaya is a Dioecious plant bearing male and female flowers on separate plants and are unable to produce viable seeds as there is no cross pollination

40. Explain the significance of meiocytes in a diploid organism.

Ans. Undergo meiosis and form haploid gametes, help to restore $2n$ (diploidy) through zygote formation or syngamy and help to restore chromosome number.

41. (a) Name the organic material exine of the pollen grain is made up of. How is this material advantageous to pollen grain ?

(b) Still it is observed that it does not form a continuous layer around the pollen grain. Give reason.

(c) How are 'pollen banks' useful ?

Ans. (a) Sporopollenin

These are most resistant to high temperature and no enzymes can degrade it

(b) (Germ pores) to allow pollen tube to emerge out

(c) Helps in storing pollen grains for years for crop breeding programmes

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42. Suggest two advantages to a farmer for using apomictic seeds of hybrid varieties.

Ans. (i) No segregation of characters in hybrid progeny.

(ii) Apomictic hybrid seeds can be used to grow crop year after year.

(iii) Economical as ordinary hybrid seeds are not used to grow crop year after year

43. Identify the type of flower shown in A and B.

Which out of the two will produce an assured seed set.

Ans. A - Chasmogamous flower B - Cleistogamous flower

Cleistogamous flower produces an assured seed set.

44. List the post-fertilization events in angiosperms.

Ans. – Development of endosperm – Development of embryo

– Seed formation – Fruit formation

45. State one advantage and one disadvantage of cleistogamy.

Ans. Advantage :- self pollination and seed production assured

Disadvantage :- Least variations and leading to inbreeding depression

46. How many haploid cells are present in a mature female gametophyte of a flowering plant? Name them.

Ans. At maturity there are two positions:

(i) If the two polar nuclei do not fuse then there are seven haploid cells in the embryo sac.

Name : Three antipodals, two synergids, one egg cell, one central cell.

(ii) If the two polar nuclei fuse to form a diploid secondary nucleus then there are six haploid cells in the embryo sac.

Name : Three antipodals, two synergids, one egg cell.

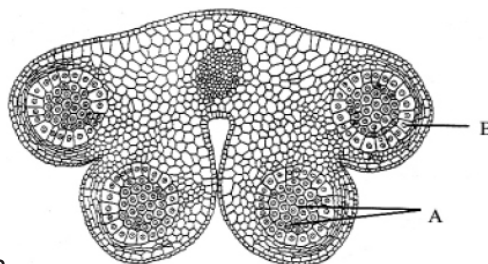
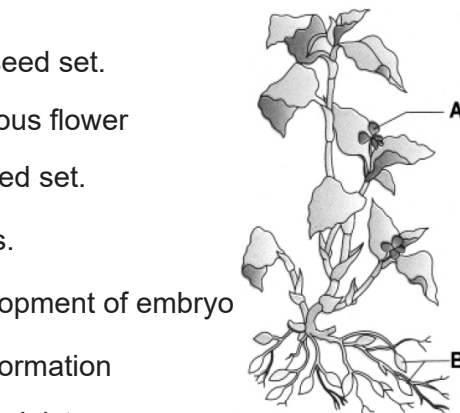
47. In the T.S. of a mature anther given below identify "A" and "B" and mention their function.

Ans. A - Sporogenous tissue;

Function : form microspores or pollen grains.

B - Tapetum

Function : nourishes the developing pollen grains.



48. (a) Why are some seeds called albuminous and others non-albuminous?

(b) Which one of the following are albuminous or exalbuminous :

(i) Pea (ii) Wheat (iii) Groundnut (iv) Maize

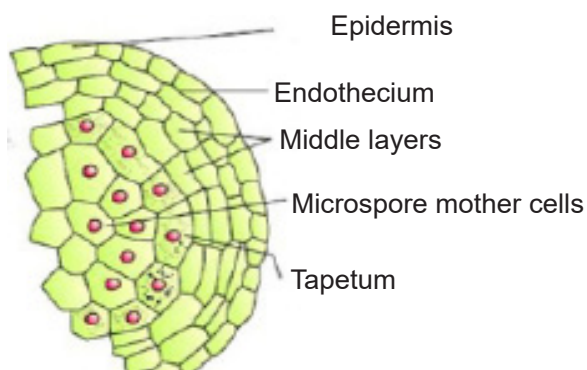
Ans. (a) Non - albuminous : No residual endosperm after seed maturation
Albuminous : Retain a part of the endosperm after seed formation

(b) Exalbuminous - Pea, Groundnut

Albuminous - Maize, Wheat

49. Draw the diagram of microsporangium of an Angiosperm and label any four parts
State the function of its innermost wall layer.

Ans.



Tapetum nourishes the developing pollen grains

50. Write the differences between wind pollinated and insect pollinated flowers. Give one example for each type of pollination.

Ans.

Wind Pollinated	Insect Pollinated
(i) Pollen grains non sticky	sticky pollen
(ii) Profuse amount of pollens produced	Fewer pollen grains are produced
(iii) Flowers are odourless or mostly inconspicuous	Flower have strong odour and produce nectar
(iv) Do not offer floral rewards	Offer floral rewards
(v) e.g. Grasses and Maize	e.g. Tulsi and Mustard

51. The flower of brinjal is referred to as chasmogamous while that of beans is cleistogamous. How are they different from each other?

Ans. Brinjal : (1) Exposed anther and stigma (2) Cross pollinated,

Bean : (1) Plants do not open and anthers and stigma lie close to each other
(2) Flowers self pollinated.

52. Name the following that form the parts of a typical angiosperm ovule :

(i) The stalk that attaches it to the placenta in the ovary.

(ii) The layers that protect it. The mass of tissue enclosed by these layers.

(iii) The different types of cells present in its mature embryo sac.

Ans. (i) Funicle

(ii) Layers : Integuments The mass of tissue enclosed: nucellus

(iii) Egg cell, synergids, antipodals and central cell