

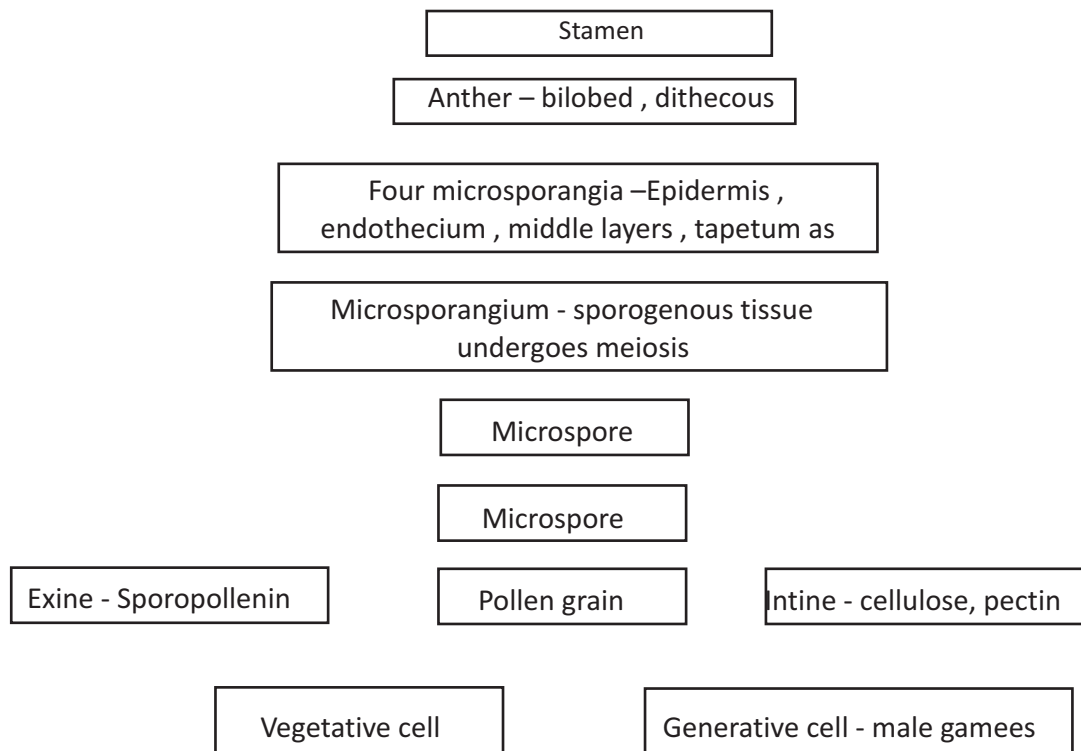
## CHAPTER : 2 SEXUAL REPRODUCTION IN FLOWERING PLANTS (KEY POINTS)

S.No	Term	Explanation
1	Microsporogenesis	Formation of microspores from a PMC through meiosis
2	Megasporogenesis	Formation of megaspores from the mega spore mother cell
3	Monosporic development	Embryo sac formation from a single megaspore
4	Pollination	Transfer of pollen grains from anther to the stigma of a pistil
5	Autogamy	Transfer of pollen grains from the anther to the stigma of the same flower
6	Geitonogamy	Transfer of pollen grains from the anther to the stigma of another flower of the same plant
7	Xenogamy	Transfer of pollen grains from anther to the stigma of a different plant
8	Artificial hybridisation	Crossing different species to combine desirable characters to produce superior varieties
9	Emasculation	Removal of anthers from flower bud before the anther dehisces
10	Bagging	Covering emasculated flowers with a bag to prevent contamination of its stigma with unwanted pollen
11	Syngamy	Fusion of male and female gamete
12	Triple fusion	Fusion of three haploid nuclei
13	Double Fertilisation	Two types of fusions syngamy and triple fusion that takes place in an embryo sac
14	Post fertilization events	Events of endosperm ,embryo development ,maturation of ovule into seed, ovary into fruit
15	Free –nuclear endosperm	The stage of endosperm development wherein PEN undergoes successive nuclear divisions to give rise to free nuclei
16	Dormancy of seed	Embryo enter a state of inactivity (Resting period of seed)
17	False fruit	Thalamus contributes to fruit formation
18	True fruit	Fruits develop from the ovary
19	Parthenocarpic fruits	Fruits develop without fertilisation
20	Apomixis	Production of seeds without fertilisation of grasses
21	Polyembryony	More than one embryo in a seed
22	Filament	Long slender stalk of stamen
23	Anther	Bilobed structure of stamen
24	Dithecous	Two theca in each lobe
25	Tapetum	Innermost wall layer of microsporangia
26	Sporogenous tissue	Compactly arranged homogenous cells in the centre of microsporangia
27	Microspore tetrad	Cluster of four microspores
28	Pollen grains	Male gametophyte

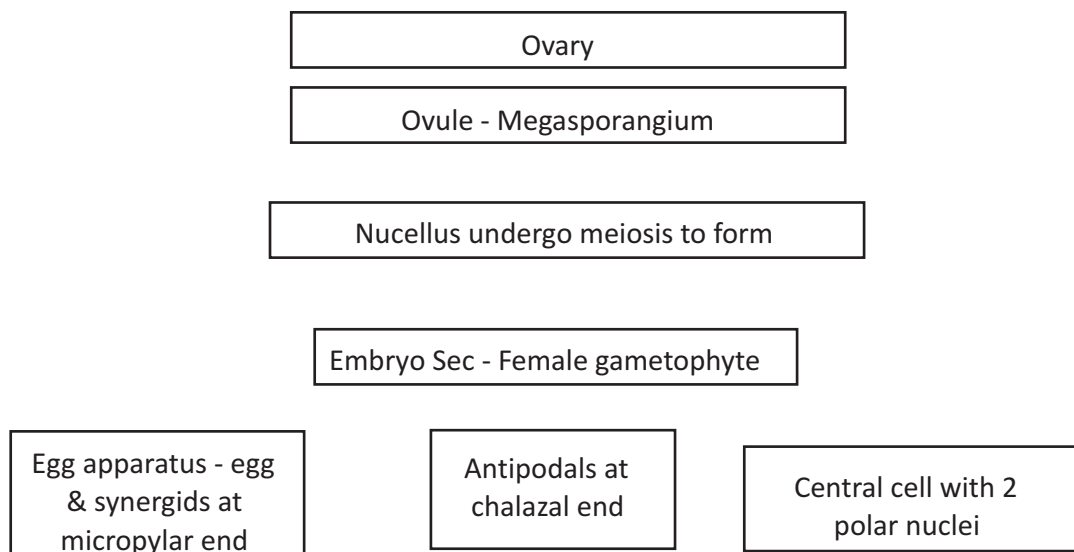
29	Exine	Hard outer layer of pollen grain
30	Sporopollenin	Most resistant organic material of exine
31	Germ pore	Apertures in pollen grain
32	Intine	Inner wall of the pollen grain
33	Generative cell	Cell floats in the cytoplasm of vegetative cell
34	Monocarpellary	Single pistil
35	Multicarpellary	More than one pistil
36	Syncarpous	Fused pistils
37	Apocarpous	Free pistils
38	Stigma	Landing platform of pollen grains
39	Style	Elongated slender part beneath the stigma
40	Ovary	Basal bulged part of pistil
41	Ovule	Megasporangia
42	Funicle	Stalk of ovule
43	Hilum	Region ,the body of the ovule fuses with funicle
44	Integuments	Protective envelopes of ovule
45	Micropyle	Small opening in the ovule
46	Chalaza	Basal part of the ovule
47	Embryo sac	Female gametophyte
48	Egg apparatus	Three cells at the micropylar end with two synergids and one egg cell
49	Antipodals	Three cells at the chalazal end
50	Cleistogamous flower	Flowers which do not open at all
51	Zygote	Diploid cell resulting out of fertilisation
52	Primary endosperm cell	Central cell after triple fusion becomes PEC
53	Embryogeny	Embryo development
54	Epicotyl	Portion of embryonal axis above the level of cotyledons
55	Hypocotyl	Portion below the level of cotyledons
56	Scutellum	Cotyledon of grass family situated towards one side of embryonal axis
57	Coleorrhiza	Undifferentiated sheath that encloses radical and root cap
58	Coleoptile	Hollow foliar structure that encloses a shoot apex and a few leaf primordia
59	Non-albuminous seed or ex-	albuminousNo residual endosperm as it is completely consumed during embryo development
60	Albuminous	Retain a part of endosperm as it is not completely used up during embryo development
61	Perisperm	Residual persistent nucellus
62	Pericarp	Wall of the fruit

## CHAPTER : 2 SEXUAL REPRODUCTION IN FLOWERING PLANTS (FLOW CHART)

### (1) Male reproductive structure - Androecium



### (2) Female Reproductive structure -



(3) **Pollination –transfer of pollen grains from anther to stigma**

Autogamy – same flower

Geitonogamy- different flower

Xenogamy – different

(4) **Agents of Pollination & characteristics of flower**

Wind - light , nonsticky,  
well exposed samens,

Water - mucilaginous , long  
, ribbon - like

Insects - large , colourful,  
fragrant, nectar

(5) **Outbreeding devices**

Non-synchronisation  
of pollen release and  
stigma receptivity

Anther and stigma  
in different

Self -  
incompatibility

Unisexual flower

(6) **Artificial hybridization**

Emasculation

Bagging

(7) **Double fertilisation**

Male gamete + Egg ---- Zygote — Embryo

Male gamete + two polar nuclei PEN — PEC

(8) **Post - fertilisation**

**PEN** ---- Endosperm --free  
nuclear/nuclear development

**ZYGOTE** develops into Embryo

**Polyembryony** - many embryos  
in a seed

OVULE develops into

OVARY develops into FRUIT

Albuminous

Non - Albuminous

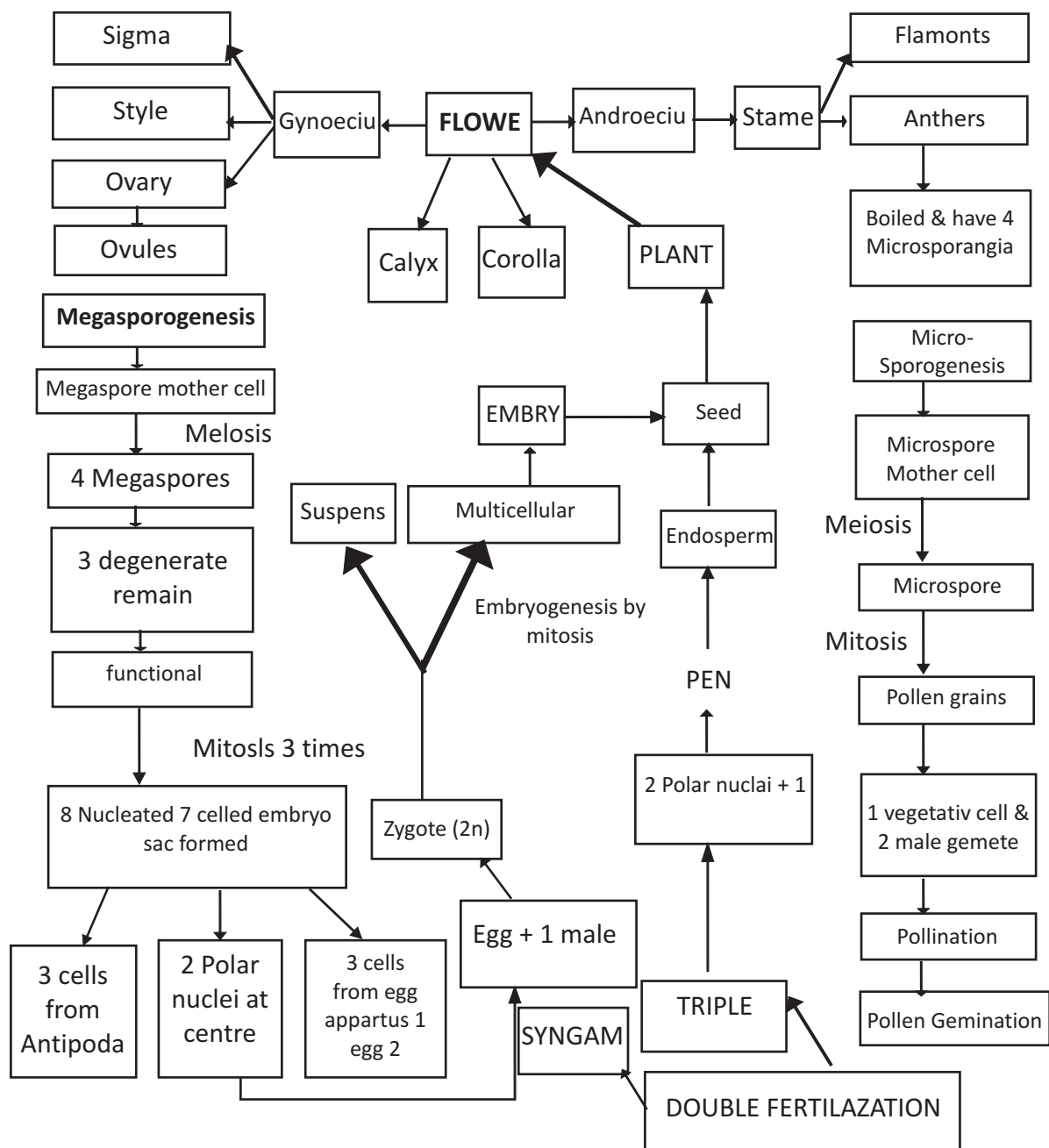
Apomictic

**False fruit** - thalamus  
becomes fruit

**Parthenocarpic fruit** - fruit  
develop without fertilization

**True fruit** - ovary develops  
into fruit

## CHAPTER 2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS



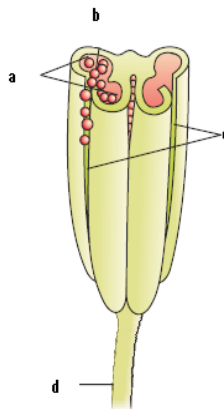
## CHAPTER. 2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS (QUESTION BANK)

### ONE MARK

1. Why are pollen grains produced in enormous quantity in maize?
2. What is the ploidy of the cells in the microspore tetrad?
3. What is the ploidy of PEN?
4. How many eggs are present in an embryo sac?
5. Even though each pollen grain has two male gametes, why are atleast 10 pollen grains and not 5 pollen grains required to fertilize 10 ovules present in a particular carpel?
6. What are parthenocarpic fruits?
7. What is scutellum?
8. What is a pollen bank?

### TWO MARKS

9. Identify the given figure and label the parts.



10. Of the eight nuclei of the embryo sac in flowering plants three are at the micropylar end. How many are there at the chalazal end and how many nuclei located in the central cell?
11. How could pollen grains be well preserved as fossils?
12. What are the effects of pollen in some people and how are the pollen grains are being used as food supplements?
13. How many haploid nuclei and haploid cells are present in the female gametophyte of angiosperm?
14. Why is the process of fertilization in flowering plant referred to as double fertilization? Explain.
15. How does geitonogamy differ from xenogamy in plants?
16. What are the stages of embryogeny in a Dicotyledonous embryo?
17. How long do the seeds remain alive after they are dispersed?

### THREE MARKS

18. Draw a diagram of the following and label any six / three parts. (i) T.S. of a mature anther. (ii) Mature pollen grain. (iii) A diagrammatic view of a typical anatropous ovule. (iv) A diagrammatic representation of the mature embryo sac . (v) Fertilized embryo sac (vi) Stages in embryo development in a dicot. (vii) Dicot embryo. (viii) L.S. of an embryo of grass (ix) a longitudinal section of a flower showing growth of pollen tube.

19. Explain the structure of microsporangium.
20. Explain the structure of pollen grain.
21. Explain artificial hybridization technique.
22. Explain double fertilization schematically.
23. What is pollination and explain its types?
24. Endosperm development precedes embryo development .Why?
25. Explain free nuclear endosperm development.
26. What are advantages of seeds to Angiosperms?
27. What do you mean by seed dormancy?What is its significance?

#### **FIVE MARKS**

28. Continued self-pollination result in inbreeding depression.What are the out breeding devices developed in flowering plants to discourage self-pollination ?Which type of pollination seen in Papaya ?
29. What are the characteristics of wind ,water and insect pollinated flowers ?
30. Explain the pollen pistil interaction with a sketch showing entry of pollen tube into a synergid.
31. Define triple fusion. What is the product of this process? What does the product develop into?
32. Trace the development of a mature female gametophyte from a megaspore mother cell.
33. Describe the development of male gametophyte in angiosperms.
34. Explain the following terms : Non-albuminous, Albuminous, Perisperm, Pericarp, seed dormancy.
35. Explain the following terms : False fruit ,True fruit, Parthenocarpic fruit, Apomixis, Polyembryony,.

**CHAPTER. 2 : SEXUAL REPRODUCTION IN FLOWERING PLANTS**  
**(MARKING SCHEME)**

Q. No.	Answer	Mark Allotted
1	Compensate to the losses during transfer of pollens	1
2	Haploid	1
3	Triploid	1
4	One	1
5	Double fertilisation	1
6	Fruits formed without fertilisation	1
7	Cotyledon of monocot	1
8	Stored pollen	1
9	a. Pollen sac b. pollen grains c. line of dehiscence d. filament	$\frac{1}{2} \times 4$
10	Three – chalazal end, two – central cell	$1 \times 2$
11	Sporopollenin , highly resistant organic material	$1 \times 2$
12	Cause severe allergies and bronchial afflictions ,tablet and syrups	$1 \times 2$
13	8-nucleate 7-celled	$1 \times 2$
14	Syngamy and triple fusion take place in an embryo sac	$1 \times 2$
15	Transfer of pollen grains from anther to stigma of another flower of same plant, different plant /genetically similar , different	$\frac{1}{2} \times 4$
16	Proembryo , globular , heart-shaped , mature embryo	$\frac{1}{2} \times 4$
17	In a few species lose viability within a few months ,live for several years	$1 \times 2$
18	Diagram	$6 \times \frac{1}{2}$
19	Wall layers , epidermis , endothecium , middle layers – protection , tapetum-nourishes , sporogenous tissue	$6 \times \frac{1}{2}$
20	Exine- sporopollenin resistant organic material,intine –cellulose and pectin , , generative cell vegetative cell	$1 + 1 \times \frac{1}{2} \times 2$
21	Emasculation- removal of anther, bagging- to prevent contamination , dusting on stigma	$1 \times 3$
22	Male gamete + egg----- Zygote-----Embryo Syngamy Male gamete + two polar endosperm triple fusion nuclei.....PEN...endosperm triple	$1\frac{1}{2} \times 2$
23	Transfer of pollen grains autogamy- same flower ,geitonogamy- different flower , xenogamy- different plant	$1 \times 3$



24	PEC divides to form endosperm tissue – filled with reserve food material , nutrition of the developing embryo	1 x 3
25	PEN –successive nuclear divisions , cell wall formation occurs –endosperm	1 x 3
26	Pollination and fertilization are independent of water - seed formation is more dependable ,better strategies for dispersal to new habitats ,hard seed coat provides protection to embryo	1 x 3
27	Water content is reduced seeds become dry , metabolic activity slows down ,state of inactivity ,storage of seeds –food throughout the year / raise crop in next season	$\frac{1}{2} \times 6$
28	Non –synchronisation of stigma receptivity and pollen release , different positions , self-incompatibility,unisexual flowers /xenogamy	1 x 5
29	Wind-large amount ,light non-sticky ,well exposed stamens,feathery stigma Water – mucilaginous covering long ribbon –like Insect-large colourful,fragrant , nectar	2+1+1
30	Dialogue by chemical components ,germinates to produce pollen tube ,content move into pollen tube,grows through stigma ,style reaches ovary , generative cell divide into two male gametes enters through micropyle , filiform apparatus guides the entry	$8 \times \frac{1}{2} + 2$
31	Male gamete moves towards two polar nuclei located in central cell and fuses to produce triploid primary endosperm nucleus involves fusion of three nuclei – triple fusion , PEN – product , Endosperm	3+1+1
32	MMC – meiosis , four megaspores , three degenerate , one functional develop into embryo sac ,mitosis of nucleus 2- nucleate , one mitosis 4-nucleate one mitosis 8 nucleate egg apparatus polar nuclei in central cell antipodals	$10 \times \frac{1}{2}$
33	MMC- meiosis – microspore tetrad , pollen grains exine , sporopollenin , intine , germ pore , vegetative cell , generative cell, two male gametes	$10 \times \frac{1}{2}$
34	No residual endosperm, retain endosperm, residual persistent nucellus, fruit wall , state of inactivity	1 x5
35	Thalamus become fruit, ovary becomes fruit , fruit formation without fertilisation, produce seeds without fertilization ,more than one seed in a seed 3	1 x5