

- **Inflorescence** : Arrangement of flowers on rachis (axis) is called Anthotaxy or Inflorescence. It has two types :
 - (A) **Racemose** : Apical bud is not transformed into flower and flowers formed in acropetal succession. It has 6 types.
 - (A-i) **Raceme** : Stalked flowers on axis. e.g., Mustard and caesalpinia
 - (A-ii) **Spike** : Sessile flowers on axis. e.g., Achyranthus
 - (A-iii) **Spadix** : Flowers bearing axis becomes fleshy. Male flowers on upperside and female flowers remain lowerside. Between male and female flowers, sterile flowers are present. Whole inflorescence is protected by foliage bract, i.e. spathe. e.g., Colocasia, Musa.
 - (A-iv) **Catkin** : Unisexual flowers on pendulous axis of spike. e.g., Mulberry, Acalypha.
 - (A-v) **Umbel** : Rachis becomes condensed and stalked flowers are arranged on it like umbrella. The whorl of bracts is called involucre. e.g., Onion, Fennel.
 - (A-vi) **Capitulum** : Peduncle becomes disc like and flat. It is called receptacle. Flowers are centripetally arranged. Peripheral flowers and central flowers are known as ray florets and disc florets respectively. Like Umbel, it also has involucre. e.g., Sunflowers and Tagetes.
 - (B) **Cymose** : Apical bud transforms into flowers.
 - (B-i) **Cymose solitary** : Only one flower is present at the tip of axis. e.g., Hibiscus, Argemone.
(Note : There is clear cut demarcation between axis of inflorescence and peduncle.)
 - (B-ii) **Uniparous (Monochasial)** : The main axis ends in a flower and growth continued by a single lateral branch. It has two types.
 - (B-ii-a) **Helicoid** : Apical bud gives rise to a single lateral branch before being transformed into flowers. The apical bud of this branch does the same. e.g., Hamelia.
 - (B-ii-b) **Scorpioid** : In this case lateral branches arise alternately on left and right sides. e.g., Heliotropium.
 - (B-iii) **Biparous (Dichasial)** : The main axis ends in a flower after producing two daughter axis in flowers. e.g., Jasmine, Nyctanthus.
 - (B-iv) **Multiparous (Polychasial)** : The main axis ends in a flower after producing more than two branches. e.g., Calotropis, Red oleander.

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- (1) In Rachis of inflorescence bears, male female and sterile flowers. Than this is a type of inflorescence.
 (A) Catkin (B) Spadix (C) Spike (D) Raceme
- (2) What is correct for inflorescence of Mustard ?
 (A) Sessile flowers (B) Stalked flowers
 (C) Sterile flowers (D) Small and clustered flowers
- (3) In which plant, inflorescence is present with spathe ?
 (A) Mulberry (B) Nyctanthus (C) Onion (D) Colocasia
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- (4) Which type of inflorescence is said if it bears involucre ?
 (A) Cymose, Multiparous (B) Racemose, Spike
 (C) Racemose, Umbel (D) Racemose, Raceme
- (5) What is wrong for inflorescence of Achyranthus ?
 (A) It has stalked flowers (B) It is a type of Racemose inflorescence
 (C) It has elongated rachis (D) It is a type of spike inflorescence
- (6) Which pair is true ?
 (A) Nyctanthus - Umbel (B) Heliotropium - Helicoid
 (C) Argemone - Scorpioid (D) Jasmine - Biparous, Cymose
- (7) "A determinate inflorescence in which the main axis ends in a flower after producing two daughter axis in flowers" – Which option is correct for this sentence ?
 (A) Scorpioid - Heliotropium (B) Helicoid - Hamelia
 (C) Biparous, Cymose - Nyctanthus (D) Biparous, Racemose - Jasmine
- (8) Which statement is true for arrangement of flowers in plant ?
 (A) One or more than one flower bearing axis.
 (B) Individual axis of every flower is called Pedicel.
 (C) Receptacle is modified inflorescence
 (D) All of the given.
- (9) How many examples are included in cymose inflorescence ?
 Red oleander, Hamelia, Mulberry, Musa, Jasmine, Tagetes, Argemone, Mustard
 (A) 4 (B) 8 (C) 6 (D) 5
- (10) How many examples are included in Racemose type of inflorescence with stalked flowers ?
 Nyctanthus, Caesalpinia, Jasmine, Hibiscus, Onion, Musa, Achyranthus, Mulberry
 (A) 4 (B) 8 (C) 2 (D) 5

Answers : (1-B), (2-B), (3-D), (4-C), (5-A), (6-D), (7-C), (8-D), (9-A), (10-C)
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- **Aestivation** : Arrangement of sepals or petals in the bud condition. It is of five types :
 - (i) **Valvate** : Sepals and/or petals without overlapping touch by their margins. e.g., Calotropis, Mustard.
 - (ii) **Twisted** : One margin overlapped by other and other margin overlapping. e.g., China Rose, Cotton
 - (iii) **Imbricate** : One member is completely outside, one member is completely inside. Rest of the members are arranged like twisted. e.g., Cassia, Delonix.
 - (iv) **Quincuncial** : Two members are outside and two members are inside completely. Rest is like twisted. e.g., Cucurbita, Melia.
 - (v) **Vexillary** : One largest member is standard, two overlapped members are alae and two smallest members are Keel. e.g., Pea and Bean.

- **Placentation** : The swollen part of ovary from which ovule is produced, is known as Placenta. The arrangement of ovules on placenta is placentation. It has five types.
 - (i) **Marginal** : In unilocular ovary, ovules are borne on inner folds of the ovarian wall. e.g., Pea, Bean.
 - (ii) **Parietal** : Unilocular ovary becomes bilocular by false septum and ovules are borne on inner periphery wall of ovary. e.g., Mustard and Argemone.
 - (iii) **Axile** : Ovules are borne on central axis. Locules of ovary is based on numbers of carpels. e.g., Tomato, Hibiscus.
 - (iv) **Free central** : There is no partitions in ovary and ovules are arranged on central axis which arises from the base of a ovary. e.g., Dianthus
 - (v) **Basal** : Ovule is borne from base of the ovary. e.g., Sunflower
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- (11) What is applicable to Dianthus for its placentation ?
- (A) No partition in ovary (B) False septum is present
(C) Ovule is at base of ovary (D) Ovule is at periphery of ovary
- (12) What is true for vexillary aestivation ?
- (A) Smallest alae, two, joint (B) Standard are small, joint, two
(C) Standards are largest, two, free (D) Keel are two, joint, and smallest
- (13) What is odd for vexillary aestivation ?
- (A) Alae are medium of size, two, free, present in pea
(B) Standards are two, largest, free, present in Bean
(C) Keel are smallest, two, joint, present in Pea and Bean
(D) None of the given
- (14) Which pair is mis-matched ?
- (A) Hibiscus - Axile (B) Dianthus - Basal (C) Bean - Marginal (D) Argemone - Parietal
- (15) Which pair is matched ?
- (A) Cotton - Valvate (B) Mustard - Twisted
(C) Cucurbita - Quincuncial (D) Cassia - Vexillary
- (16) Which plant shows twisted aestivation and axile placentation ?
- (A) Sunflower (B) Hibiscus (C) Datura (D) Calotropis
- (17) What is true for Mustard plant ?
- (A) Valvate aestivation, Parietal placentation
(B) Twisted aestivation, Parietal placentation
(C) Valvate aestivation, Marginal placentation
(D) Twisted aestivation, Marginal placentation
- (18) One chambered ovary is becomes two chambered due to formation of false septum-Name the type of placentation and give it location.
- (A) Axile - Hibiscus (B) Marginal - Pea
(C) Free central - Dianthus (D) Parietal - Argemone

- (19) Which type of placentation is present in a plant having vexillary aestivation ?
 (A) Axile (B) Parietal (C) Marginal (D) Basal
- (20) What is suitable for a plant having only one ovule ?
 (A) Marginal - Pea (B) Basal - Sunflower
 (C) Axile - Hibiscus (D) Free central - Dianthus

Answers : (11-A), (12-D), (13-B), (14-B), (15-C), (16-B), (17-A), (18-D), (19-C), (20-B)

- **Flower** : Well developed flower is sexual reproductive organ of angiosperm plants. Its stalk like organ is called Pedicel and its swollen part of tip is called thalamus. From out side to inside calyx and corolla are two accessory whorls and Androecium and gynoecium are two essential whorls.
- **Calyx** : Every member of calyx is sepal. It protects flower in bud condition. It is normally green, fleshy and foliage type. They are either free or united.
- **Corolla** : Every member of corolla is Petal. It is of tubular, bell, funnel, wheel or butterfly in shape. It attracts insects for pollination. As it posses colour, scent and sometime honey gland. It is free or united.

Note : In plants like crinum. Bougainvillea, Panchratrium the petals and sepals are similar in reference to colour and size. They are known as Perianth. (Tepals)

- **Androecium** : Every member of Androecium is stamen. Stamen has Anther at its tip, filament and connective connects filament and Anther. It can be divided in (i) Monodelphous (China rose), (ii) Didelphous (pea) and (iii) Polydelphous (citrus).

Sometime stamens are united with petals, they are epipetalous stamens. e.g., Hibiscus, Cotton, Datura. In beginning the pollen sac is four chambered. When pollen becomes mature and dehiscence from slit or pore, at that time pollen sac becomes two chambered. Pollens are smooth, spiny, edible type.

- **Gynoecium** : Every member of gynoecium is carpel. It is divided into three regions like, stigma which is receptive for pollens, tubular style and basal swollen region ovary bears ovules. It can be divided in Monocarpellary flower (Pea), or Polycarpellary flower. Polycarpellary flowers can be again divided into (a) Apocarpous - e.g., Rose, Lotus (free carpels) or (b) Syncarpous - e.g., Datura, Hibiscus (united carpels).

- (21) What is true for Hibiscus in reference to its aestivation, placentation, Androecium and Gynoecium ?
 (A) Twisted, Axile, Monodelphous, Polycarpellary united
 (B) Valvate, Axile, Monodelphous, Polycarpellary free
 (C) Twisted, Parietal, Diadelphous, United Polycarpellary
 (D) Valvate, Marginal, Diadelphous, Free Polycarpellary
- (22) Which plant posses syncarpous gynoecium and epipetalous stamens ?
 (A) Mustard (B) Pea (C) Datura (D) Lemon

- (23) Which family possesses vexillary aestivation, marginal placentation, Diadelphous stamens and monocarpellary flower ?
 (A) Solanaceae (B) Liliaceae (C) Papilionoideae (D) Malvaceae
- (24) What is Perianth ?
 (A) When sepals and petals are dissimilar in shape-size-colour
 (B) When sepals and petals are similar in shape-size-colour
 (C) When stamens and carpels are dissimilar in shape-size-colour
 (D) When stamens and carpels are similar in shape-size-colour
- (25) Which pair is matched ?
 (A) Syncarpous carpels - Lotus (B) Diadelphous stamens - Hibiscus
 (C) Monocarpellary flower - Hibiscus (D) Polydelphous stamen - Citrus
- (26) Which pair is mis-matched ?
 (A) Syncarpous carpels - Hibiscus (B) Diadelphous stamens - Citrus
 (C) Monocarpellary flower - Pea (D) Monodelphous stamen - Hibiscus
- (27) How many chambers are present in mature anther ?
 (A) 1 (B) 2 (C) 3 (D) 4
- (28) How many parts are of carpels among given parts ?
 Style, Anther, Stigma, Filament, Ovary, Pollen, Connective
 (A) 4 (B) 3 (C) 5 (D) 2
- (29) These are the parts of a whorl comes next to corolla on thalamus ?
 (A) Connective, Stigma (B) Anther, Stigma
 (C) Anther, Style (D) Anther, Filament
- (30) Calyx and corolla are known as accessory whorls. Because...
 (A) They do not take part in reproduction (B) In absence of them, reproduction is possible
 (C) They do not produces any reproductive cells (D) They produces helper reproductive cells

Answers : (21-A), (22-C), (23-C), (24-B), (25-D), (26-B), (27-B), (28-B), (29-D), (30-C)

• **Types of flower :**

- (i) **According to number of floral whorls :** (1) Complete : All whorls are present (2) Incomplete : Any one or more whorls are absent.
- (ii) **According to presence of essential whorls :** (1) Bisexual : Both essential whorls are present (2) Unisexual : (Male = only Androecium is present) (Female = only Gynoecium is present)
- (iii) **According to symmetry :** (1) Actinomorphic (Radial symmetry) : Flower can be bisect in two equal halves by any plane. e.g., Hibiscus, Datura. (2) Zygomorphic (Bilateral symmetry) : Flower can be bisect in two equal halves by only one plane. e.g., Bean, Caesulpinia.
- (iv) **According to number of floral components :** (1) Isomerous : All the components are equal in number. e.g., trimerous, tetramerous, pentamerous.

(2) Heteromerous : All the components are not equal in number.

(v) **According to presence of Bract :** (1) Bracteate : Bract is present. e.g., Bougainvillea

(2) Ebracteate : Bract is absent. e.g., caesalpinia

(vi) **According to location of ovary :** (1) **Hypogynous flower :** Thalamus becomes conical shape on which ovary located at highest position, so, ovary is called superior. e.g., Mustard, China rose, Datura.

(2) **Perigynous flower :** Thalamus becomes flat and disc like on which ovary located semi-inferiorly. e.g., Rose, caesalpinia.

(3) **Epigynous flower :** Thalamus envelops ovary and ovary is inferior. e.g., sunflower, cucumber.

- (31) What type of a flower is called, which does not arise from axil of a leaf ?
(A) Heteromerous (B) Ebracteate (C) Hypogynous (D) Radial
- (32) What type of a flower is called, when all the members are equal in number and gynoecium is absent ?
(A) Heteromerous - Unisexual (B) Isomerous - Bisexual
(C) Isomerous - Unisexual (D) Heteromerous - Bisexual
- (33) In spadix inflorescence, the types of flowers is
(A) Unisexual (B) Bisexual (C) Only male (D) Only female
- (34) In which plant, a flower is present, which can be divided in equal two halves by any plane ?
(A) Bean (B) Pea (C) Caesalpinia (D) Datura
- (35) Zygomorphic flower means
(A) Unisexual flower (B) All member are equal in number
(C) Bisect by any plane (D) Bisect by only one plane
- (36) Which pair is suitable for flower type and its related example ?
(A) Superior ovary - Datura (B) Semi inferior ovary - Rose
(C) Inferior ovary - Cucumber (D) All the given
- (37) Which pair is not matched for type of flower and its related example ?
(A) Superior ovary - Caesalpinia (B) Semi inferior ovary - Rose
(C) Inferior ovary - Sunflower (D) All the given
- (38) Which option is correct for a flower whose ovary is located at lower position in compare to other members ?
(A) Hypogynous flower, Inferior ovary (B) Epigynous flower, Inferior ovary
(C) Perigynous flower, Inferior ovary (D) Perigynous flower, Superior ovary
- (39) What is true for Hibiscus ?
(A) Flower can be divided in equal two halves by any plane.
(B) The aestivation is twisted type.
(C) It has axile placentation and have many carpels but one ovary only.
(D) All of the given.

(40) Which term is improper for Bean flower ?

Zygomorphic flower, Vexillary aestivation, Marginal placentation, Isomerous flower, Unisexual flower, Bracteate flower

(A) Isomerous flower

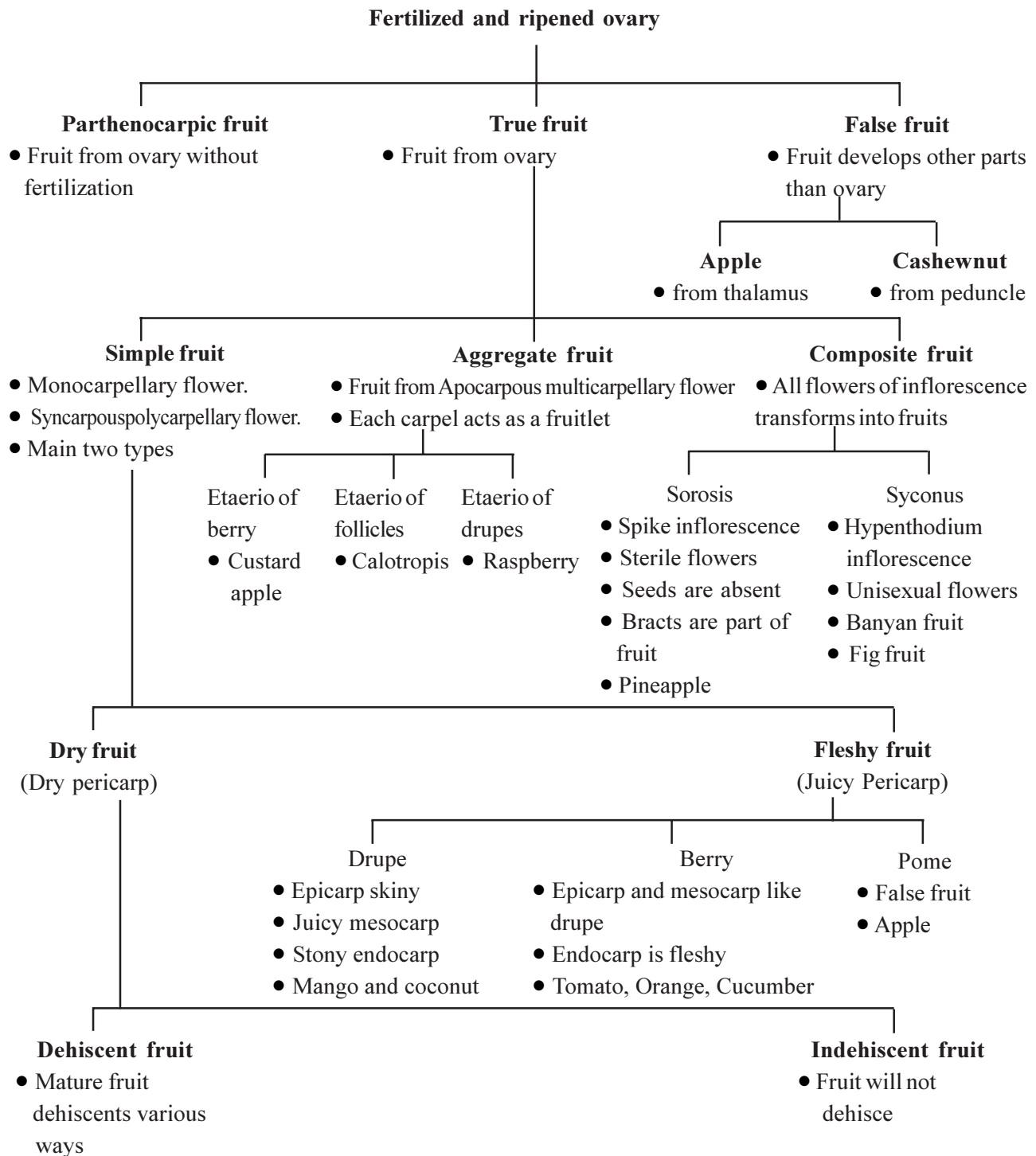
(B) Unisexual flower

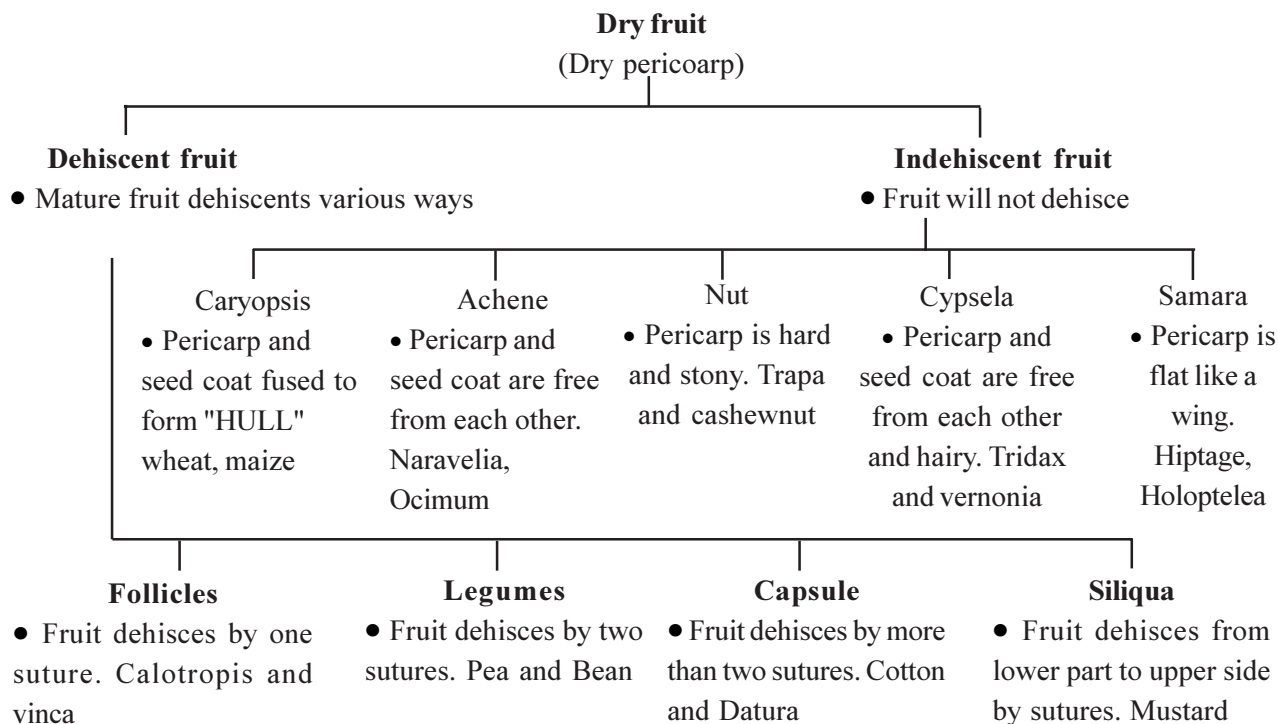
(C) Bracteate flower

(D) Marginal placentation

Answers : (31-B), (32-C), (33-A), (34-D), (35-D), (36-D), (37-A), (38-B), (39-D), (40-B)

• **Fruit :**





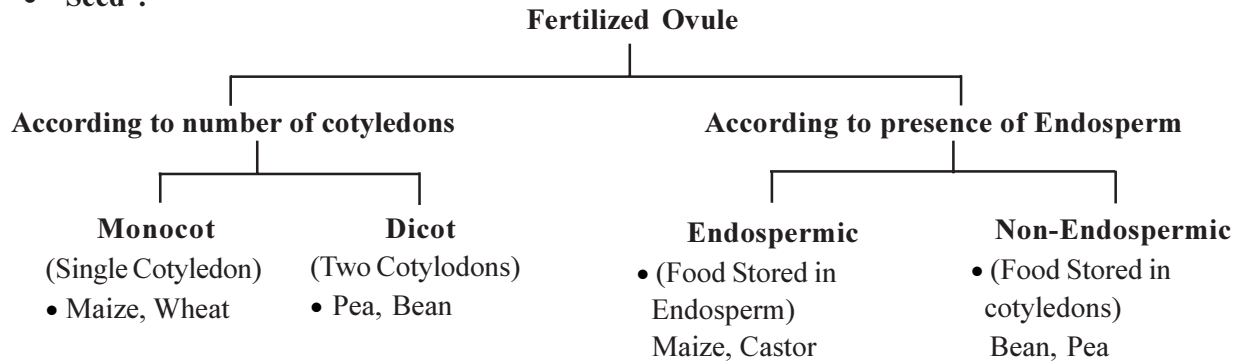
Note : Calotropis flowers are bicarpellary. Stigma are joint but style and ovary are free, so that it can be included both in simple fruit and aggregate fruit as well.

- (41) Which fruit has fleshy mesocarp and endocarp ?
 (A) Drupe - Coconut (B) Drupe - Orange (C) Berry - Mango (D) Berry - Tomato
- (42) Parthenocarpic fruit means...
 (A) Seedless fruit develops after fertilization (B) Seedless fruit develops without fertilization
 (C) Seeded fruit develops after fertilization (D) Seeded fruit develops without fertilization
- (43) Apple and cashew nut are called false fruit. Because...
 (A) Seedless fruit develops without fertilization
 (B) Seeded fruit develops without fertilization
 (C) Main fruit is not developed from ovary
 (D) No role of ovary in formation of fruit
- (44) How many dehiscence and indehiscence fruits are given respectively among given list of fruits ?
 Mustard, Vinca, Mango, Naravelia, Vernonia, Hiptage, Datura, Coconut, Calotropis, Trapa, Apple
 (A) 4, 4 (B) 4, 5 (C) 5, 4 (D) 3, 3
- (45) Which pair is mis-matched ?
 (A) Hull - maize (B) Wing like pericarp - Holoptelea
 (C) Hard pericarp - Nut (D) Hairy pericarp - Naravelia
- (46) Which pair is matched ?
 (A) Follicles - Pea (B) Legumes - Vinca
 (C) Capsule - Datura (D) Siliqua - Cotton

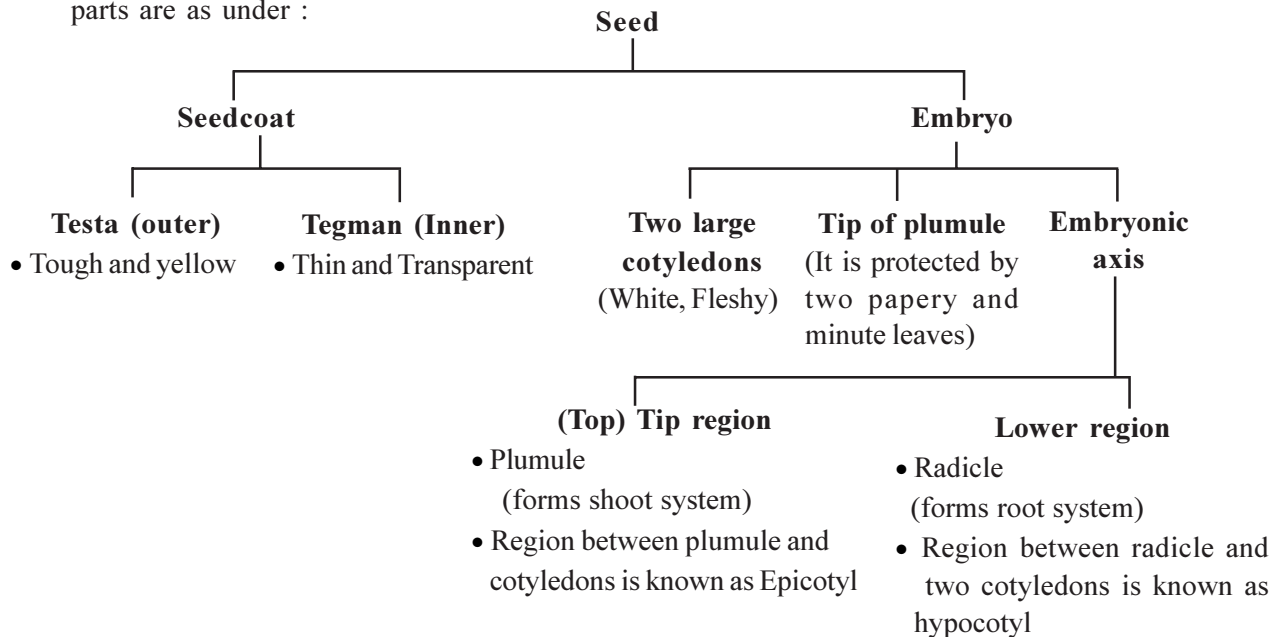
- (47) Which is the characteristic of dehiscence in fruit of Mustard ?
 (A) Dehisces by more than two sutures
 (B) Dehisces by two sutures from lower to upper part
 (C) It is a type of fruit which develops without fertilization
 (D) Legume fruit with a single seed
- (48) What is true for the fruit of Raspberry ?
 (A) Mesocarp and endocarp both are fleshy.
 (B) Only Mesocarp is fleshy or juicy
 (C) It is an example of composite drupe fruit
 (D) All the flowers of inflorescence transforms into fruits
- (49) Which option is correct for the fruit of Fig ?
 (A) It has bisexual flowers (B) It has only male or female flowers
 (C) It has male, female and sterile flowers (D) It has only sterile flowers
- (50) In development of Banyan tree fruit, which part forms fruit in addition to ovary ?
 (A) Peduncle (B) Receptacle (C) Sepals (D) (B) and (C) both
- (51) What is main structural difference between fruit of orange and coconut ?
 (A) Epicarp (B) Mesocarp
 (C) Endocarp (D) None of the given
- (52) Composite fruits means...
 (A) Many carpels of a single flowers transform into fruit
 (B) Every carpels of many flowers transform into fruit
 (C) 'A' and 'B' both (D) None of the given
- (53) Which statement is not applicable to custard apple ?
 (A) Each carpels of a single flower transform into fruitlets.
 (B) Endocarp of fruitlet is hard and stony.
 (C) It is Etaerio of berry type fruit.
 (D) None of the given.
- (54) Which option is not applicable to pineapple ?
 (A) Fruit develops from cymose inflorescence
 (B) Flowers are normally Sterile
 (C) Seed formation is very rare
 (D) Bracts are a part of fruit
- (55) Which option is correct for a fruit which forms hull by fusion of pericarp and seed coat ?
 (A) Achene - Mirabilis (B) Nut - Cashew nut
 (C) Samara - Holoptelea (D) Caryopsis - Maize

Answers : (41-D), (42-B), (43-C), (44-A), (45-D), (46-C), (47-B), (48-B), (49-B), (50-B), (51-C), (52-B), (53-B), (54-A), (55-D)

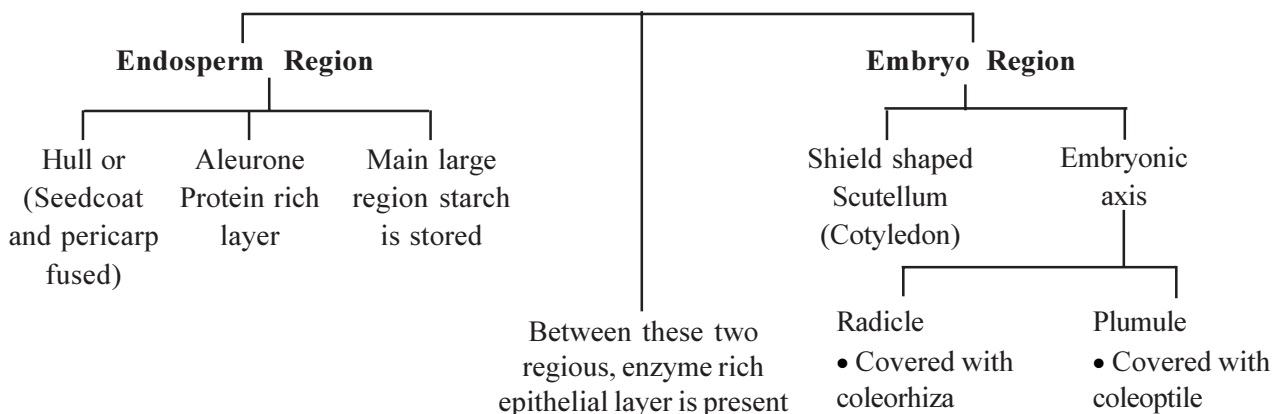
• **Seed :**



- **Structure of Bean Seed :** Hilum is on seed which is meant for connection of seed with fruit. It is flat, kidney shape and yellowish white in colour. It is dicot and non-endospermic seed. It has parts as under :



- **Structure of Maize Seed :** It is narrow at one end and broad at other end. It is yellow in colour. Longitudinal section of seed stained with iodine shows purple endospermic region due to storage of starch and embryo is stained yellow due to protein. It has parts as mentioned below :



- (56) What type of cotyledons are present in non-endospermic seed ?
 (A) Thin (B) Fleshy (C) Flesh or thin (D) With endosperm
- (57) What is the function of coleoptile and coleorhiza ?
 (A) Protection (B) Nutrition (C) Support (D) Photosynthesis
- (58) Scutellum means...
 (A) Fleshy single cotyledon (B) Thin single cotyledon
 (C) Fleshy two cotyledons (D) Thin two cotyledons
- (59) What is stored in Aleurone layer ?
 (A) Starch (B) Lipid (C) Protein (D) Enzyme
- (60) Which one is the largest region in Maize seed ?
 (A) Scutellum (B) Endosperm (C) Plumule (D) Radicle
- (61) Hilum means...
 (A) Food storage region of seed (B) Water absorbing part of seed
 (C) Connecting part of seed to fruit (D) Endosperm region of seed
- (62) Which is not the characteristic of tegmen of Bean seed ?
 (A) Leathery (B) Thin (C) Transparent (D) Soft
- (63) What is true for cotyledons of castor seed ?
 (A) Endospermic - fleshy (B) Non-endospermic and fleshy
 (C) Endospermic - thin (D) Non-endospermic and thin
- (64) Why Bean seed is known as non-endospermic ?
 (A) It has no nutrition for germination.
 (B) It has endospermic tissue in endosperm.
 (C) Endosperm is present but has no nutrition.
 (D) Nutrition of endosperm is absorbed by cotyledons
- (65) Which statement is applicable for a seed which has coleoptile and coleorhiza ?
 (A) Largest region of this seed possesses protein.
 (B) Aleurone region of this seed possesses starch.
 (C) Scutellum is fleshy and purple coloured.
 (D) It has hull around it.

Answers : (56-B), (57-A), (58-B), (59-C), (60-B), (61-C), (62-A), (63-C), (64-D), (65-D)

- **Floral formula :** In floral formula, number of each components of flower, connection of each component with each other, location on the thalamus, etc. has been given by symbols as mention below :

Bract :

Br = Bracteate

Ebr = Ebracteate

Brl = Bracteolate

Symmetry :

$\oplus$ = Regular flower or

Actinomorphic

θ or $\%$ = Irregular flower
or Zygomorphic

Sex :

$\sigma^{\nearrow}$ = Male flower (Staminate flower)

$\ominus$ = Female flower (Pistillate flower)

$\sigma^{\nearrow} \oplus$ = Bisexual flower

Calyx :

K = Sepals

 K_4 = Four free sepals $K_{(4)}$ = Four united sepals
(fused)**Corolla :**

C = Petals

 C_4 = Four free petals $C_{(4)}$ = Four fused petals**Perianth :**

P = Tepals

 P_6 = Six free tepals $P_{(6)}$ = Six fused tepals P_{3+3} = Six tepals in two whorls of
three each• **Androecium :**

A = Stamen, A_5 = Five free Stamens, $A_{(5)}$ = Five fused Stamens, K_{5+5} = Ten Stamens in two whorls of five each

A_0 = Stamens absent, A_∞ = Stamens indefinite in number, $\overline{CA}$ = Epipetalous Stamens, $\overline{PA}$ = Epiphyllous Stamens

• **Gynoecium :**

G = Carpel, G_2 = Two free Carpels, $G_{(2)}$ = Two fused Carpels, G_0 = Carpels absent,

$\underline{G}_{(2)}$ = Bicarpellary, syncarpous superior ovary, $\overline{G}_{(2)}$ = Bicarpellary, syncarpous semi-inferior ovary, $\overline{G}_{(2)}$ = Bicarpellary, syncarpous inferior ovary

• **Floral Diagram :**

Top dot shows position of axis with respect to flower. From outer to inner side Calyx, Corolla Androecium and gynoecium is mentioned. Extrose anthers are to be faced towards the petals and introse anthers are to be faced towards the gynoecium. Staminoids are represented by ($\times$) or (*), i.e. cross or asterisk. Bract is also mentioned and if possible placentation is also mentioned.

- (66) What is true for floral diagram with symbol “(*)” ?
 (A) Only self pollination is possible (B) Only cross pollination is possible
 (C) Any type of pollination is possible (D) No pollination takes place
- (67) Extrose stamens means; The length of stamens is...
 (A) more than petals (B) less than petals
 (C) responsible for cross pollination (D) responsible for self pollination
- (68) Which is not true for a flower with symbol $\overline{PA}$?
 (A) Sepals and petals are similar in colour-shape size.
 (B) Stamens are epipetalous type.
 (C) Perianth is present instead of calyx and corolla.
 (D) Stamens are sterile and in large number.
- (69) What is correct for a floral formula with symbol $\bigcirc^{\nearrow}$?
 (A) G_2 (B) A_0 (C) G_0 (D) All of the given
- (70) Which symbols are correct for Datura flower ?
 (A) $\overline{G}_{(n)}, \oplus$ (B) $\overline{G}_{(n)}, \Phi$ (C) $G_{\overline{n}}, \oplus$ (D) G_0, Φ
- (71) $\overline{G}_\infty$ This symbol is applicable to which flower ?
 (A) Hibiscus (B) Cucumber (C) Rose (D) Mustard
- (72) What can be assumed for a floral formula with “($\times$)” symbol ?
 (A) Sterile Stamens (B) Stamens are absent
 (C) Large number of Stamens (D) None of the given

- (73) Which pair is mis-matched ?
 (A) Bougainvillea - Br (B) Caesalpinia - Ebr (C) Bean - $\oplus$ (D) Datura - %
- (74) Which floral formula is not according to rule or is not practical ?
 (A) $\oplus, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_{2+2}, C_4 \dots$ (B) $\Phi, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_5, C_5 \dots$
 (C) $\oplus, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_3, C_3, P_{3+3} \dots$ (D) $\Phi, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_{(5)}, C_{(5)} \dots$
- (75) Ebr, $\oplus, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_{(5)}, \overline{C_{(5)}A_5}, G_0$ - What is wrong with this floral formula ?
 (A) In regular flower, stamens are not epipetalous (B) Epipetalous stamens are not free
 (C) In bisexual flower carpels are not absent (D) All of the given

Answers : (66-D), (67-A), (68-B), (69-C), (70-A), (71-C), (72-A), (73-C), (74-C), (75-C)

• **Family :**

(1) Fabaceae	(2) Solanaceae	(3) Liliaceae
• Class → Dicot	Dicot	Monocot
Subclass → Polypetalae	Gamopetalae	---
Series → Calyciflorae	Bicarpellatae	Coronariae
Order → Rosales	Polymoniales	---
Family → Fabaceae	Solanaceae	Liliaceae
• e.g. <i>Cajanus cajan</i> (Pegion pea)	<i>Datura fastuosa</i> (Datura)	<i>Alium cepa</i> (onion)
<i>Phaseolus mungo</i> (Green gram)	<i>Solanum melongena</i> (Brinjal)	<i>Aloe vera</i> (Kunwarpathu)
<i>Cicer arietinum</i> (Chana)	<i>Solanum tuberosum</i> (Potato)	<i>Asparagus racemosus</i> (Satavari)
<i>Derris indica</i> (Karanj)	<i>Solanum nigrum</i> (Piludi)	<i>Gloriosa Superba</i> (Vachhnag)
<i>Lathyrus aphaca</i> (Pea)		<i>Asphodelus tenuifolius</i> (Dungro)
• Floral formula :		
Br, $\Phi, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_{(5)}, C_{1+2+(2)}, A_{1+(9)}, \underline{G}_1$	Ebr, $\oplus, \overset{\nearrow}{\underset{+}{\bigcirc}}, K_{(5)}, \overline{C_{(5)}A_5}, \underline{G}_{(2)}$	Br, $\oplus, \overset{\nearrow}{\underset{+}{\bigcirc}}, \overline{P_{3+3}A_{3+3}}, \underline{G}_{(3)}$
• Economic Importance :		
Pulses : Black gram, green gram, Bean, Pea, Lentil. Edible Oil : Groundnut, Soyabean	Food : Potato, tomato, Brinjal Medicine : Ashwagandha	Medicines : Aloe and Asparagus Ornamental plants : Tulip
Dyes : Indigofera	Spices : Chilli	---
Fibers : Sun hemp	Ornamental plants : Petunia	---
Medicine : Muliathi	---	---
Fodder : Sesbania, crotonaria	---	---
• Flower :		
Complete, Zygomorphic, Bisexual, Pedicellate, Bracteate, Perigynous	Complete actinomorphic, Bisexual, hypogynous, pentamerous	Complete, actinomorphic, Bisexual, trimerous, Bracteate, hypogynous

• Calyx :		
Five, gamosepalous, Imbricate aestivation	Five, gamosepalous, tubular, persistent, valvate aestivation	----
• Corolla :		
Five, polypetalous,	Five, gamopetalous,	----
papilionaceous	Valvate aestivation	----
• Perianth :		
----	----	3+3 free, valvate aestivation
• Androecium :		
10 diadelphous (9) + 1 ditheous anther	Five epipetalous, introse	3+3, free, periphylous, introse or extrose
• Gynoecium :		
Superior ovary, Unilocular, mono-carpellary ovary, marginal placentation	2, syncarpous, ovary superior, axile placentation	3, syncarpous, superior ovary, axile placentation
• Inflorescence :		
Racemose	Solitary cyme, Helicoid, apical or axillary	Solitary, axillary, Cymose, Umbellate
• Leaf :		
Pinnately compound or simple, alternate, leaf base pulvinate, stipules spiny, reticulate venation	simple, alternate, hairy, exstipulate, pinnately dissected, Reticulate venation	simple, alternate, opposite or whorled, exstipulate, mostly basal, parallel venation
• Habit :		
Tree, shrubs, herbs, climbers	Herb, climbers, shrubs, small trees	Herbaceous, climbers, bulb, rhizome
• Fruit :		
Legume, one or many seeds. seed non-endospermic	capsule or berry seed endospermic	capsule, berry, seed endospermic
• Habitat :		
Distributed all over the world	In tropical and temperate region	Major parts of the world (xerophytes)

(76) Tulip will included in which series ?

- (A) Disciflorae (B) Calyciflorae (C) Coronariae (D) Bicarpellatae

(77) Which plant has ebracteate flower ?

- (A) *Cajanus cajan* (B) *Aloe vera* (C) *Alium cepa* (D) *Solanum nigrum*

(78) Which symbol is correct for *Solanum melongena* ?

- (A) $\overline{C_{(5)} A_5}$ (B) $\overline{P_{3+3} A_{3+3}}$ (C) $\overline{C_{(5)} A_{(5)}}$ (D) $\overline{C_5 A_5}$

(79) How many plants are used as medicines ?

Tulip, Petunia, Ashwagandha, Indigofera, Susbenia, Muliathi, Aloe vera, Crotolaria

- (A) 3 (B) 4 (C) 2 (D) 5

- (80) Which pair is matched ?
 (A) Solanaceae - Axile placentation (B) Solanaceae - Inferior ovary
 (C) Liliaceae - Marginal placentation (D) Liliaceae - Inferior ovary
- (81) Which pair is not matched ?
 (A) Fabaceae - seed non-endospermic (B) Solanaceae - seed endospermic
 (C) Fabaceae - Imbricate aestivation (D) Solanaceae - Twisted aestivation
- (82) How many plants has complete, irregular (zygomorphic), bisexual flowers ?
 Datura, Onion, Brinjal, Kunwarpathu, Green gram, Pegion pea, Potato, Satavari, Chana, Piludi, Vachhnag
 (A) 3 (B) 4 (C) 2 (D) 1
- (83) In which plant epiphyllous stamens are present ?
 (A) *Aloe vera* (B) *Solanum tuberosum* (C) *Cajanus cajan* (D) *Datura fastuosa*
- (84) In which plant the leaves are exstipitated ?
 (A) Fabaceae (B) Liliaceae (C) Solanaceae (D) (B) and (C) both
- (85) In which plants calyx is persistant ?
 (A) Satavary (B) Brinjal (C) Karanj (D) Pegion pea
- (86) Which is subfamily of family Leguminoceae ?
 (A) Malvaceae (B) Solanaceae (C) Fabaceae (D) Liliaceae
- (87) $\text{Ebr}, \oplus, \ominus^{\nearrow}, K_{(5)}, \overline{C_{(5)} A_{(5)}}, \underline{G}_{(2)}$ - This floral formula is of which family ?
 (A) Malvaceae (B) Solanaceae (C) Fabaceae (D) Liliaceae
- (88) Which plant has a heteromerous flower ?
 (A) Brinjal (B) Karanj (C) Potato (D) (A) and (C) both
- (89) $\text{Br}, \oplus, \ominus^{\nearrow}, \overline{P_{3+3} A_{3+3}}, \underline{G}_{(3)}$ - which option is correct for leaves of the family which has this floral formula ?
 (A) Simple, parallel venation (B) Simple, Reticulate venation
 (C) Compound, parallel venation (D) Compound, Reticulate venation
- (90) $\text{Br}, \oplus, \ominus, K_{(5)}, C_{3+3}, A_0, \underline{G}_{(3)}$ - which option is true for given floral formula ?
 (A) It has perianth in two whorls of five each.
 (B) It is not complete flower.
 (C) It is not isomerous flower.
 (D) None of the given

Answers : (76-C), (77-D), (78-A), (79-A), (80-A), (81-D), (82-A), (83-A), (84-D), (85-B), (86-C), (87-B), (88-B), (89-A), (90-B)

- (91) Inflorescence of given figure is present in which plant ?

- (A) Mustard (B) Mulberry
 (C) Musa (D) Achyranthus

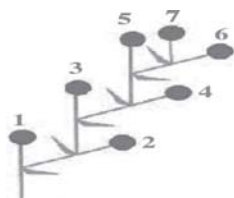


(92) What is correct for inflorescence of given figure ?

- (A) Cymose, scorpioid (B) Racemose, Scorpioid
(C) Racemose, Raceme (D) Cymose, Uniparous



(93) What is correct for inflorescence of a given figure ?



- (A) Cymose, scorpioid
(B) Racemose, Scorpioid
(C) Racemose, Raceme
(D) Cymose, Helicoid

(94) Which option is correct for aestivation and its related plant according to given figure ?

- (A) Quincuncial - Cassia (B) Imbricate - Delonix
(C) Imbricate - Melia (D) Quincuncial - Cucurbita



(95) Which option is correct for placentation and its related plant according to given figure ?

- (A) Axile - Hibiscus (B) Free cental - Dianthus
(C) Free central - Sunflower (D) Axile - Dianthus



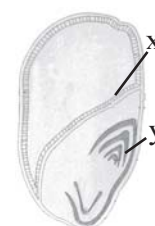
(96) What is type of flower and location of ovary in the give figure ?

- (A) Epigynous, Inferior ovary (B) Perigynous, Semi-inferior ovary
(C) Hypogynous, Superior ovary (D) Hypogynous, Inferior ovary



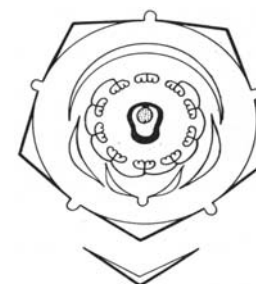
(97) What does X and Y indicates in given figure ?

- (A) x=Epithelial layer, y=Plumule (B) x=Aleurone layer, y=Radicle
(C) x=Epithelial layer, y=Radicle (D) x=Aleurone layer, y=Plumule



(98) Which option is correct for stamens and petals in the given figure ?

- (A) Stamens = Introse, Petals = Vexillary
(B) Stamens = Introse, Petals = Valvate
(C) Stamens = Extrose, Petals = Vexillary
(D) Stamens = Extrose, Petals = Valvate



Answers : (91-D), (92-C), (93-A), (94-D), (95-B), (96-A), (97-A), (98-A)

(99) Match the column :

Column - I

- (1) Umbel
(2) Spike
(3) Spadix
(4) Capitulum

Column - II

- (p) Foliage bract
(q) Sessile flowers
(r) Florets arranged in centripetally
(s) Inflorescence with involucre
(t) Stalked flowers
(B) (1 - t), (2 - s), (3 - p), (4 - r)
(D) (1 - s), (2 - q), (3 - p), (4 - r)

- (A) (1 - s), (2 - t), (3 - p), (4 - r)
(C) (1 - s), (2 - p), (3 - r), (4 - t)

(100) Match the column :

Column - I

- (1) Mustard
- (2) Tomato
- (3) Ocimum
- (4) Vernonia

Column - II

- (p) Hairy fruit
- (q) Siliqua
- (r) Berry
- (s) Achene
- (t) Drupe

- (A) (1 - s), (2 - r), (3 - p), (4 - q)
- (B) (1 - q), (2 - s), (3 - t), (4 - p)
- (C) (1 - q), (2 - r), (3 - s), (4 - p)
- (D) (1 - p), (2 - q), (3 - s), (4 - t)

(101) Match the column :

Column - I

- (1) *Cajanus cajan*
- (2) *Gloriosa Superba*
- (3) *Derris indica*
- (4) *Solanum melongena*

Column - II

- (p) Pentamerous
- (q) Actinomorphic
- (r) Bisexual
- (s) Stalked
- (t) Trimerous

Column - III

- (v) Twisted
- (w) Imbricate
- (x) Valvate
- (y) Quincuncial
- (z) Vexillary

- (A) (1-s-x), (2-t-w), (3-q-z), (4-p-v)
- (B) (1-r-y), (2-p-x), (3-s-w), (4-q-z)
- (C) (1-r-z), (2-t-x), (3-s-z), (4-p-v)
- (D) (1-s-y), (2-t-y), (3-s-w), (4-q-z)

(102) Match the column :

Column - I

- (1) Epithelial layer
- (2) Aleurone layer
- (3) Endosperm
- (4) Cotyledons

Column - II

- (p) Enzymatic layer
- (q) Stained yellow by iodine
- (r) Protein rich layer
- (s) Thin, one, scutellum, shield shape
- (t) Becomes purple by iodine

- (A) (1 - p), (2 - q), (3 - t), (4 - s)
- (B) (1 - p), (2 - q), (3 - r), (4 - s)
- (C) (1 - p), (2 - q), (3 - s), (4 - t)
- (D) (1 - t), (2 - q), (3 - r), (4 - s)

(103) Match the column :

Column - I

- (1) Sessile flower
- (2) Radial symmetry
- (3) Ebracteate flower
- (4) Bilateral symmetry

Column - II

- (p) Bean
- (q) Pea
- (r) Datura
- (s) Achyranthus
- (t) Caesalpinia

- (A) (1 - s), (2 - q), (3 - t), (4 - p)
- (B) (1 - s), (2 - r), (3 - t), (4 - p)
- (C) (1 - s), (2 - r), (3 - p), (4 - q)
- (D) (1 - q), (2 - r), (3 - t), (4 - p)

(104) Match the column :

Column - I

- (1) $\overline{C_{(5)} A}_5$
- (2) Ebr
- (3) $\overline{P_{3+3} A}_{3+3}$
- (4) C_{1+2+2}

Column - II

- (p) Potato
- (q) *Cicer arietinum*
- (r) Onion
- (s) Satavari
- (t) Piludi

- (A) (1 - t), (2 - p), (3 - s), (4 - q)
- (B) (1 - p), (2 - s), (3 - r), (4 - q)
- (C) (1 - t), (2 - p), (3 - s), (4 - r)
- (D) (1 - t), (2 - p), (3 - r), (4 - s)

(105) Match the column :

Column - I

- (1) Rose
- (2) Pea
- (3) Hibiscus
- (4) Lemon

Column - II

- (p) Apocarpous polycarpellary
 - (q) Diadelphous stamens
 - (r) Monocarpellary
 - (s) Syncarpous polycarpellary
 - (t) Polydelphous stamens
- (A) (1 - q), (2 - r), (3 - s), (4 - p)
(B) (1 - s), (2 - q), (3 - r), (4 - t)
(C) (1 - p), (2 - r), (3 - q), (4 - s)
(D) (1 - p), (2 - q), (3 - s), (4 - t)

Answers : (99-D), (100-C), (101-C), (102-A), (103-B), (104-A), (105-D)

• **A - Assertion and R - Reason type questions :**

Select the proper option for answer of given questions.

(A) A and R are true. R is correct explanation of A.

(B) A and R are true. R is not correct explanation of A.

(C) A is false, R is true.

(D) A is true, R is false.

(106) Assertion A : In onion, inflorescence is umbel type.

Reason R : Rachis becomes condensed and sessile flowers are arranged like spokes of umbrella.

- (A) (B) (C) (D)

(107) Assertion A : Pollen germinates only on stigma.

Reason R : Stigma is receptive for pollen or it has adequate chemical for pollen germination.

- (A) (B) (C) (D)

(108) Assertion A : In Acalypha, inflorescence is spike type.

Reason R : In Acalypha, the rachis is like pendulum type and bears unisexual flowers.

- (A) (B) (C) (D)

(109) Assertion A : Sepals and petals are accessory and stamens and carpels are essential reproductive organs.

Reason R : Sepals and petals are not capable of producing reproductive cells but stamen and carpel can produce pollen and egg cell respectively.

- (A) (B) (C) (D)

(110) Assertion A : In Hibiscus, placentation is axile type.

Reason R : Hibiscus, aestivation is twisted type.

- (A) (B) (C) (D)

(111) Assertion A : Although Pancratium has not petals, it shows pollination.

Reason R : Instead of petals, in Pancratium, tepals are useful in pollination.

- (A) (B) (C) (D)

(112) Assertion A : In Mustard, aestivation is of valvate.

Reason R : In Mustard, the placentation is Parietal type.

- (A) (B) (C) (D)

- (113) Assertion A : Leguminous fruit is dehiscence fruit.
Reason R : In leguminous fruit, dehiscence takes place by one suture.
(A) (B) (C) (D)
- (114) Assertion A : Caesalpinia has perigynous type flowers.
Reason R : In ceasalpinia, thalamus becomes flat like disc, ovary is arranged semi inferiorally into it.
(A) (B) (C) (D)
- (115) Assertion A : Apple is known as false fruit.
Reason R : In apple, in addition to ovary, peduncle is also participated in formation of fruit.
(A) (B) (C) (D)
- (116) Assertion A : The cotyledons of non-endospermic seeds are always fleshy.
Reason R : Cotyledons comprises food of endosperm, they becomes fleshy.
(A) (B) (C) (D)
- (117) Assertion A : Berry fruit is soft in compare to drupe fruit.
Reason R : In Berry fruit, the endocarp is juicy or fleshy.
(A) (B) (C) (D)
- (118) Assertion A : Maize is caryopsis type of fruit.
Reason R : In maize, pericarp becomes flat like wings.
(A) (B) (C) (D)
- (119) Assertion A : In Fabaceae family, for petals the symbol $C_{1+2+(2)}$ is used in floral formula.
Reason R : In Fabaceae family, aestivation is vexillary type.
(A) (B) (C) (D)
- (120) Assertion A : In Vachhnag, the sepals are persistent.
Reason R : Vachhnag is included in Liliaceae family.
(A) (B) (C) (D)

Answers : (106-D), (107-A), (108-C), (109-A), (110-B), (111-A), (112-B), (113-D), (114-A), (115-D), (116-A), (117-A), (118-D), (119-A), (120-C)

• **False and True (T - F) type questions :**

Select correct option for answer of given true and false sentences.

- (121) Assertion x : In capitulum inflorescence, the ray florets are in center.
Assertion y : In capitulum inflorescence, the disc florets are in periphery.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (122) Assertion x : In Heliotropium, inflorescence is scorpioid type.
Assertion y : Flowers are arises from left or right side of the rachis.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (123) Assertion x : In crinum, no individual calyx or corolla.
Assertion y : In crinum, perianth attracts insects for pollination.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right

- (124) Assertion x : In Hibiscus, aestivation is twisted type.
Assertion y : In Hibiscus, placentation is like in tomato.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (125) Assertion x : In Bean, stamens are monodelphous.
Assertion y : In Bean, gynoecium is monocarpellary.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (126) Assertion x : Radial symmetry is present in Caesalpinia.
Assertion y : Flowers are bracteate in Caesalpinia.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (127) Assertion x : Fruit of Mustard is called Siliqua.
Assertion y : Ovary is superior in Mustard.
(A) Both are wrong (B) Both are right (C) x = right, y = wrong (D) x = wrong, y = right
- (128) Assertion x : *Asparagus racemosus* is useful as Medicine.
Assertion y : Satavary is included in Liliaceae family.
Assertion z : $\oplus$, $\overset{\nearrow}{\underset{+}{\bigcirc}}$, K_{2+2} , C_4 , K_{2+4} , $\underline{G}_{(2)}$ is floral formula of liliaceae family.
(A) x, y = right, z = wrong (B) x, z = right, y = wrong
(C) y, z = right, x = wrong (D) x, y = wrong, z = right
- (129) Assertion x : In maize, it has a shield type scutellum and fleshy endosperm.
Assertion y : Protein is stored in Aleurone layer of maize.
Assertion z : Large amount of starch is stored in epithelial layer of maize.
(A) x, z = right, y = wrong (B) x, z = wrong, y = right
(C) x, y = right, z = wrong (D) y, z = wrong, x = right
- (130) Assertion x : Fruit of calotropis is follicle type.
Assertion y : Calotropis possesses multiparous cymose type of inflorescence.
Assertion z : Aestivation is valvate in calotropis.
(A) All are wrong (B) All are right
(C) y, z = right, x = wrong (D) x, y = right, z = wrong

Answers : (121-A), (122-C), (123-B), (124-B), (125-D), (126-A), (127-B), (128-A), (129-C), (130-B)

• **Questions for NEET :**

- (131) Which example does not have compound Umbel inflorescence ?
(A) Fennel (B) Onion (C) Cumin (D) Coriander
- (132) In which example compound raceme inflorescence is present ?
(A) Delonix (B) Neem (C) (A) and (B) Both (D) Radish
- (133) Which plant possesses Biparous cymose inflorescence ?
(A) Jasmine (B) Sal
(C) Mirabilis (D) All of the given
- (134) Both Racemose and Cymose inflorescence are present in
(A) Grapes (B) Palm (C) Hydrocotyl (D) Sunflower

- (135) Which example group possesses actinomorphic flower ?
 (A) Mustard, Datura, Chilli (B) Pea, Groundnut, Delonix
 (C) Datura, Mustard, Delonix (D) Mustard, Delonix, Cassia
- (136) What is special feature of Hibiscus flower ?
 (A) Have only petals but not sepals
 (B) Have sepals in addition to epicalyx
 (C) Sepals are useful in pollination
 (D) Sepals are persistent or long lived
- (137) Water of coconut can be compared to
 (A) Embryo (B) Endosperm (C) Pericarp (D) Seed coat
- (138) Caruncle or stopluole means...
 (A) Connection of seed with fruit (B) Spot shows connection of style
 (C) Extra seed coat of seed (D) Micropyle of seed
- (139) Which example possesses attractive sepals for pollination ? (i.e. Advertisement flag)
 (A) Mussaenda (B) Larkspur (C) Balsum (D) All of the given
- (140) In which fruit, edible part is not seen ?
 (A) Almond (B) Mango (C) Trapa (D) Pulses

Answers : (131-B), (132-C), (133-D), (134-A), (135-A), (136-B), (137-B), (138-C), (139-A), (140-B)

