Question Bank
Vegetative Propagation

1. Define vegetative reproduction.
Ans. Vegetative reproduction is the formation of a new individual from any vegetative part of the plant body.

2. Mention any two disadvantages of vegetative reproduction.
Ans. Disadvantages of vegetative reproduction.
(i) Year after year same variety is produced. New varieties cannot be produced by this method.
(ii) Since all the plants are genetically alike, they are susceptible to same diseases.
(iii) The plants when grown repeatedly may lose vigour.
(iv) Undesirable characters get transmitted from one generation to another.

3. Differentiate between cutting and grafting.
Ans. Differences between Cutting and Grafting

<table>
<thead>
<tr>
<th>Cutting</th>
<th>Grafting</th>
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<tbody>
<tr>
<td>1. A single individual is involved.</td>
<td>Two different individuals are involved.</td>
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<td>2. Short pieces of stem or root are taken,</td>
<td>The root portion (stock) of one plant</td>
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<td>cut obliquely at the lower end and placed</td>
<td>attached with the stem portion (scion) of the</td>
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<td>in soil.</td>
<td>other plant; the ends of stock and scion are</td>
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<td></td>
<td>cut obliquely, placed face to face and tied.</td>
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<td>3. It does not bring about any improvement</td>
<td>It is practised to improve the varieties or</td>
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<td>in the subsequent plant.</td>
<td>produce disease-resistant plants.</td>
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<td>Examples - Coleus, rose.</td>
<td>Examples - Mango, citrus, apple.</td>
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4. Rose is propagated both by cutting and budding. What are the advantages of these methods?

**Ans.** Both cutting and budding are artificial methods of vegetative propagation.

**Advantages of cutting**
(i) It is a very simple method.
(ii) It takes less time and is less expensive.

**Advantages of budding**
(i) New varieties with desired characters like colour or disease-resistance can be obtained by taking recourse to sexual process.
(ii) It can be easily practised.

5. Enumerate the various advantages of vegetative propagation.

**Ans.** **Advantages of Vegetative Propagation**
(i) The plants that cannot produce viable seeds such as banana, seedless grapes and oranges, rose, jasmine, sugar cane, Chrysanthemum etc. can be easily grown by vegetative propagation.

(ii) As the plants grown from the seeds may show variations due to genetic recombination, to get genetically identical copies and to maintain and **preserve a stock of selected varieties** vegetative propagation is the only means.

(iii) It is an easier, less expensive and a rapid method of propagation. For example, a lily plant may take five to seven years to flower when grown from a seed but would flower within two years when grown vegetatively.

(iv) Vegetative propagation takes much less time and so is highly suitable for plants that have small number of seeds (like Bermuda grass or doob grass), poor seed viability or longer periods of seed dormancy.

(v) Superior quality fruits or flowers can be produced by the method of grafting.
(vi) By tissue culture, a large number of disease-free identical plants can be grown in a very short time.

6. Describe different methods of artificial vegetative propagation.

Ans. Methods of Artificial Vegetative Propagation

In artificial vegetative propagation, a vegetative portion of a plant is separated and grown, to maintain the desirable characters of the parents. A number of ornamental plants, orchids, plants of economic and medicinal value are grown by artificial means.

Different methods include

(i) cutting,
(ii) layering,
(iii) grafting, and
(iv) micropropagation using tissue culture

(i) Cuttings

(a) Stem cuttings: Cuttings are short lengths of the plant which when removed and placed in soil with suitable conditions develop adventitious roots and leaves and grow into independent plants. Sometimes the stem cutting has to be dipped into a rooting hormone to stimulate rooting. Rose, Coleus, Begonia, African violet-Saintpaulia are easily propagated by cuttings.

(b) Root cuttings: In certain plants, like lemon, tamarind, etc. root cuttings when put in the damp soil give rise to roots and shoots and form new plants.
(ii) **Layering**

In this, the adventitious buds are induced before the stem is cut to form a new plant. It could be done by two methods:

(a) **Mound layering**

(b) **Air layering**

(a) **Mound layering**: The lower branch of the stem is bent so that a part of the stem at a node is buried beneath the soil. The growing tip remains above the soil surface. After sometime, the adventitious roots grow at the node. Now this new plant can be cut from the parent plant and planted as a new independent plant. This method is used in plants like jasmine strawberry, etc.

(b) **Air layering**: This method is used in plants having thick branches which cannot be easily bent. In plants like rubber, part of the stem is girdled (i.e., a ring of bark is removed), covered with moist cotton or moss, and enclosed in a polythene bag. After some time, adventitious roots appear. At this stage, the branch is cut and planted. It grows into a new individual.
(iii) Grafting

In grafting, the ultimate plant is derived from two different individuals. The root portion taken from one plant is called the stock, while the stem portion from the other is called the scion. Scion is the plant which one wants to propagate and so it is grafted on to the stock. The grafting ends of the stock and scion are obliquely cut and placed face to face. Care is taken to place the grafting ends in such a way that the cambia of the two are in intimate contact. Then the two ends are tied tightly. Grafting is generally not successful in monocots as they lack cambium. Grafting may be practised by any of the following two methods:

(a) Bud grafting: When a scion of a dormant bud from a desired variety is grafted on to the disease-resistant root stock, it is called bud grafting or budding. The scions of good coloured roses are grafted on the wild rose root stocks by this technique.

(b) Grafting by stem cutting: It is generally for those plants which are closely related. Either bark is cut or a slit is made in the stock to which twigs of the scion are inserted, and firmly bound until the cambia are fused. It is commonly used to improve the fruits like mango, citrus and apple. Very important in all forms of grafting that cambium of the scion should be in direct contact with the cambium of the stock.
(iv) Cloning

It is a technique of producing genetically identical individuals from a single cell. In this technique, an entire organism is developed from a cell that is still unspecialised and contains all the information required to code for an entire organism. The single cell cultures have been successfully produced in carrots. The potential benefits of this technique are unlimited.

(v) Tissue Culture

Generally, the tissue taken is from the plant meristem as it is composed of undifferentiated and immature rapidly dividing cells. The tissue is grown in a suitable medium containing necessary nutrients and hormones. The tissue grows into an unorganised mass known as callus. Small parts of this tissue are put in another medium which induces the formation of plantlets. The plantlets can be transplanted in the soil or in pots. This technique is also called micropropagation. Since in a very short time, unlimited number of plants can be produced, this technique is being used for the propagation of disease-free orchids, carnation, _Gladiolus, Chrysanthemum_, potato, sugarcane and other ornamental plants.

Micropropagation : A. Culture tube with tissue, B. Organised callus, C. Plantlets developed from callus.
7. Give the importances of hybridization.

**Ans.** Hybridization aims at producing hybrids or new varieties with following better qualities:

- Higher yielding
- Better quality
- Disease resistant
- Drought resistant
- Flood resistant
- Early maturing
- Responsive to manuring
- Adaptability to wide range of habitat
- Insect and pest resistant.

8. Describe the role of biotechnology in (i) medicine and (ii) industry.

**Ans.**

(i) Biotechnology has tremendous potential in the field of medicine. New drugs, new vaccines, prevention of diseases and better diagnosis are the hope for the future. Insulin was the first human protein to be manufactured by recombinant DNA technology. Besides this, Human growth hormone, Bovine growth hormone, Interferon, Interleukins, etc. are formed by using biotechnology.

(ii) Biotechnology in industry, or industrial biotechnology, has the potential to provide chemicals and industrial products in bulk to meet the demands of the growing world population. Food supplement, flavour enhancer, alcoholic beverages, fermented foods, etc., are produced in large scale by industrial biotechnology.

9. **Complete the following by selecting the correct word**:

(i) __________ is a technique of plant breeding to bring about crop improvement. (cloning / hybridization)

(ii) The removal of anthers from the flower is called __________. (hybridization / emasculation / cutting)

(iii) In rose, vegetative propagation is artificially brought about by __________. (root cuttings / stem cuttings / layering)
(iv) The technique of producing genetically identical individuals from single cell is called __________.
   (cloning / grafting / tissue culture)
(v) A large number of disease-free plants can be produced in a very short time using the technique of __________.
   (micropropagation / grafting / cuttings)

Ans. (i) Hybridization  (ii) Emasculation
(iii) Stem cuttings  (iv) Cloning  (v) Micropropagation

10. Mention whether the following statements are True (T) or False (F) :
(i) An advantage of vegetative propagation is that undesirable characters do not get transmitted from one generation to another.
(ii) Air layering is employed in plants having thick branches which cannot be easily bent.
(iii) The rooted stem part of a plant on which a twig or a bud of another is grafted is called scion.
(iv) Both mitotic and meiotic cell divisions occur in vegetative propagation.
(v) Two different individuals are involved in grafting.

Ans. (i) F   (ii) T   (iii) F   (iv) F   (v) T