

I. ESSAY QUESTIONS (*5 points each*)

1. There are two major types of seed dormancy: seed coat dormancy and embryo dormancy. How do they differ and how can they be overcome? Be specific on your discussion.
2. Seed germination in pansies is often sporadic and not uniform. How can this problem be eliminated? Provide procedures for altering the osmotic strength of seed tissues as a means of overcoming this problem.
3. Discuss the merits of vegetative (clonal) propagation over seed propagation with examples.
4. Some “off-types” are found, at a low frequency, among the plants that are propagated by vegetative means. Discuss the origins of such changes, including genetic and epigenetic variations.

II. SHORT ANSWERS (various points)

1. Which plant growth regulator can be used to overcome dormancy requirements in certain seeds: (2 points)

Answer _____

2. Distinguish the following terms that are used in seed treatments: (3 points)

- a. Disinfestants _____
- b. Disinfectants _____
- c. Protectants _____

3. Distinguish the four different stages of seedling development in plug production: (4 points)

- a. Stage I _____
- b. Stage II _____
- c. Stage III _____
- d. Stage IV _____

4. Define the following terms used in vegetative propagation of plants: (4 points)

- a. Ramet _____
- b. Ortet _____
- c. True-to-type _____
- d. Off-type _____

5. When plants undergo an abrupt change from juvenile growth to maturity, the phase change is said to be (_____ homoblastic, _____ heteroblastic). (check one) (2 points)

6. Contrast a tap root vs. an adventitious root: (2 points)

7. Match the following histogenic layers of a meristem with each of the organs formed in plants generated by stem cuttings: (4 points)

- | | |
|--------------------------|-------------------------------|
| _____ histogenic layer 1 | a. roots |
| _____ histogenic layer 2 | b. epidermis |
| _____ histogenic layer 3 | c. internal tissues (pith) |
| _____ histogenic layer 4 | d. gametes (pollen, egg cell) |

8. List a causal agent for mutation induction in plants: (2 points)

Answer _____

9. Define 'totipotency' in plants: (3 points)

10. When Norfolk Island pine is propagated by cuttings, plants grown from a lateral branch will exhibit a(n) _____ growth habit, while plants grown from the main stem will show a(n) _____ growth habit. (fill in) (3 points)

- a. orthotropic
- b. pleiotropic

11. Describe the difference between a phytohormone and a growth regulator. (3 points)

12. What is meant by "dedifferentiation" and why is it needed in the process of clonal propagation? (3 points)

13. Name a cytokinin that is synthetically made: (2 points)

14. List three plants which can be propagated by leaf cuttings: (3 points)

- a. _____
- b. _____
- c. _____

III. MULTIPLE CHOICE (2 points each)

1. Which of the following is **not** required in the labeling of commercial seed according to the Federal Seed Act?

- a. Seed origin
- b. Percent germination
- c. Presence of virus in the seed tissue
- d. Purity

2. When the color of seed tissue turns red during the triphenyl tetrazolium chloride (TTC) test, the seed is considered to be:
 - a. viable.
 - b. non-viable.
 - c. capable of germination.
 - d. incapable of germination.

3. Which of the following parts of a tree would provide the most juvenile cuttings?
 - a. Water sprouts formed at the base of the trunk
 - b. Fruit bearing spurs
 - c. Stems obtained from the distal end of the main stem.
 - d. Stems obtained from a scaffold branch

4. Which of the following methods would produce “off-types” when a periclinal chimeric plant is vegetatively propagated?
 - a. Leaf cutting
 - b. Stem cutting
 - c. Grafting
 - d. Budding

5. A plantation composed of plants of a monoclonal (only one clone), as compared to that composed of polyclones (more than one clone), may have a problem:
 - a. due to low yield.
 - b. of non-uniform plant growth and harvesting time.
 - c. caused by lack of resistance when a virulent strain of pathogen develops.
 - d. of pollen sterility.

6. Which of the following chemical is a naturally occurring auxin?
 - a. Indoleacetic acid (IAA)
 - b. Naphthaleneacetic acid (NAA)
 - c. Indolebutyric acid (IBA)
 - d. None of the above

7. Which of the following plants has the shortest juvenile phase?
 - a. Elm
 - b. Apple
 - c. Rose
 - d. Oak

8. The variegated sansevieria (*Sansevieria trifasciata laurentii*) is not propagated by leaf cuttings because the regenerated plants become non-variegated.
- a. True
 - b. False
9. A mutant trait that is transmitted maternally (or by cytoplasm) is caused by changes in cytoplasmic genes located in either mitochondria or chloroplast.
- a. True
 - b. False
10. During plant propagation by root cuttings, adventitious buds usually develop from:
- a. epidermal tissues.
 - b. the pith.
 - c. the pericycle region..
 - d. xylem tissues.

BONUS QUESTION (4 points)

Make your own question from subjects that you have studied but were **not covered** in this exam and answer it correctly.

Honor Pledge: Upon my honor I have neither given nor received aid in writing this exam.

Signed _____