I. ESSAY QUESTIONS (5 points each)

1. Contrast the following terms as they apply to plant propagation with examples. (Answer only three out of four questions for full credit.)
   a. Sexual vs. asexual propagation
   b. Zygotic vs. apomictic seeds
   c. Genotype vs. phenotype
   d. Genomic (x) vs. gametic (n) number of chromosomes

2. List four general requirements that must be met before a new cultivar is released and provide reasons for each.

3. List four environmental factors that must be controlled for a plant propagation facility and discuss how they influence plant growth.

4. Draw cross section of a woody plant stem and label where the pith, year-rings, xylem, cambium, phloem and bark are located.
5. Define the following terms as they relate to variation in seed sources used for plant propagation:
   a. Provenance
   b. Ecotypes
   c. Clines

6. Define the following terms used for seed development and plant growth.
   a. Phase change
   b. Vernalization
   c. Polyembryony
   d. Recalcitrancy

7. Discuss the characteristics of three different types of seeds used in horticulture with examples:
   a. Type 1 seed
   b. Type 2 seed
   c. Type 3 seed

8. Contrast the different between dormancy and quiescence in reference to seed germination.

II. SHORT ANSWERS/MATCHING (various points)

1. If a cross was made between two different parental lines (P₁=AABB, P₂=aabb), the resulting F₁ hybrid would have a genotype of __________, which is highly (____homozygous, ____heterozygous). (Check one) (3 points)
2. What is the difference between a clone and a pure line? (3 points)

__________________________________________________________________________________

3. Contrast variety vs. “cultivar.” (3 points)

__________________________________________________________________________________

4. The basic genomic number (x) of chromosomes in potato is 12, and the cultivated potato is a tetraploid. Indicate the number of chromosomes contained per cell for different parts of the cultivated potato: (3 points)

a. Tuber _____________  b. Leaf tissue ___________  c. Pollen ___________
   d. Seed endosperm ________  e. zygotic embryo __________

5. Match the following parts of the ovary with the names of fruit tissues which they will eventually develop into: (4 points)

   ____ Pericarp  a. Seed coat
   ____ Zygote  b. Seed endosperm
   ____ Funiculus  c. Fruit
   ____ Integuments  d. Hilum
   ____ Ovule  e. Embryo
   ____ Endosperm  f. Seed

6. Match each of the following types of apomixes with a correct definition: (3 points)

   a. Adventitious apomixis  b. Recurrent apomixis
   c. Non-recurrent apomixis  c Vegetative apomixis

   ____ Embryos developed from egg mother cells without meiosis
   ____ Embryos formed from nucellar cells
   ____ Bulbils formed on flower heads (as in onion)
   ____ Embryos developed from egg nucleus without fertilization

7. Define ‘somatoplastic sterility’ and explain how it occurs? (3 points)

__________________________________________________________________________________

8. What is “vivipary” and how does it occur? (3 points)

__________________________________________________________________________________

9. Cotyledon leaves are buried in soil during (_______ hypogeous, ______ epigeous) germination. (Check one) (2 points)

10. Three major components of a seed are: a) ______________ , b)_______________ , c)______________ (3 points).

11. Physiological (embryo) dormancy can be eliminated by (______ scarification, _____ stratification). (Check one) (2 points)
12. Reasons why the coastal lines of northern California are popular for growing horticultural crops for seed production: (3 points)

_________________________________________________________________________________
_________________________________________________________________________________

13. Match the following types of seed dormancy with correct definitions: (3 points)

<table>
<thead>
<tr>
<th>Type of Dormancy</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paradormancy</td>
<td>a. dormancy caused by unsuitable environment</td>
</tr>
<tr>
<td>Ecodormancy</td>
<td>b. dormancy caused by internal physiological factors</td>
</tr>
<tr>
<td>Endodormancy</td>
<td>c. dormancy caused by physical or biological factors externally imposed</td>
</tr>
</tbody>
</table>

14. Abscisic acid (ABA) is a germination (_____ promoter, _____ inhibitor) in most seeds. (Check one) (2 points)

III. MULTIPLE CHOICE/TRUE AND FALSE (2 points each)

1. Apomictic seeds are:
   a. genetically identical to the maternal plant.
   b. always homozygous.
   c. developed from zygotic embryos.
   d. polyploids.

2. Which of the following is a correct nomenclature for “Dakota Pearl” potato?
   b. *Solanum tuberosum* “Dakota Pearl”
   c. *Solanum tuberosum* cv. ‘Dakota Pearl’
   d. *Solanum tuberosum* ‘Dakota Pearl’

3. Which of the following soil amendments has the highest cation exchange capacity (CEC)?
   a. Perlite
   b. Peat
   c. Sand
   d. Rockwool

4. Recalcitrant seeds lose germinability when dried.
   a. True
   b. False

5. Polyembryony is likely to be found in:
   a. citrus crops like oranges.
   b. corn.
   c. lilies.
   d. gymnosperms like pines.
6. A species that produces female and perfect flowers on the same plant is:
   a. dioecious
   b. monoecious
   c. andromonoecious
   d. Gynomonoeceous

7. Which of the following plants would have the largest number of cotyledons on the seedling?
   a. Monocot plants like lily and wheat
   b. Dicot plants like pea and tomato
   c. Gymnosperms like pine and cedar
   d. Plants of Liliaceae

8. Which of the following plant growth regulators is most effective in eliminating seed dormancy in general?
   a. Ethephon (ethylene-releasing)
   b. Cytokinin (BA, Zeatin, or Kin)
   c. Abscisic Acid (ABA)
   d. Gibberellin (GA$_3$)

9. Aeration of germinating seeds is needed for:
   a. photosynthesis.
   b. respiration.
   c. transpiration.
   d. dormancy breaking.

10. Lettuce and onion seeds typically require a cool temperature for good germination.
    a. True
    b. False

**BONUS QUESTION** (3 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 examination._

_Signed__________________________________________________________

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