I. COMMODITY SECTION (99 points)

(11 points) SUBTROPICAL FRUITS (MAR)

(1 point) (T / F) Avocado fruit can be "stored" on the tree (circle the correct answer).

(10 points) For each of the following, list the optimum recommended value for degreening fresh citrus in Florida and WHY each is important (e.g., why is xx the recommended degreening temperature and not a lower or higher temperature? )

Temperature (2 points):

Ethylene concentration (2 points):

Humidity (2 points):

Ventilation (2 points):

Air circulation (2 points):
(11 points) TROPICAL FRUITS (MAR)

(2 points) What is the one feature that all tropical fruits have in common?

(2 points) (T / F) All tropical fruits display a climacteric ripening pattern.

(2 points) (T / F) Banana, Papaya, and/or Pineapple quality can be maintained best in the same modified or controlled atmosphere conditions as strawberry?

(2 points) What is the cause of “endogenous brown spot” (EBS) and what tropical fruit does it affect?

(3 points) List one factor that you think most limits the importation of tropical fruits into the United States and briefly state why you consider it so important?
(11 points) SMALL FRUITS (MAR)

(2 points) Briefly state the main way that high CO₂ environments help maintain strawberry quality longer. In other words, how do high CO₂ environments act to increase strawberry shelf life?

(3 points) With few exceptions, all small fruits are non-climacteric and are not chilling sensitive. What is one small fruit exception for each attribute?

Chilling Sensitive:

Climacteric:

(6 points) List three (3) reasons why table grapes generally have longer storage potential than most other small fruits like strawberry, blackberry, raspberry, etc.? 
(3 points) What is the “ranch pack” system of harvesting and packing stone fruits?

(4 points) The edible flesh of pear fruit becomes mealy when they ripen on the tree. Describe the two methods that are used so that pears will ripen postharvest with a desirable, juicy flesh.

1. 

2. 
(2 points) Apples and kiwifruit have almost identical storage requirements. In spite of that, they should never be stored together. What is the reason for that?

(2 points) Cherries are an exception to the typical postharvest physiology of pome and stone fruits in that they exhibit a nonclimacteric ripening pattern. How do the harvesting and/or handling practices for cherries differ from the pome and stone fruits due to this physiological difference?
(7 points) What physical or physiological characteristics of leafy and succulent vegetables make them more perishable than mature fruit vegetables and storage organ vegetables.

(4 points) Why is MA/CA not typically used for leafy and succulent vegetables even though they can benefit from its use? In what situation is MA/CA used for leafy and succulent vegetables?
(8 points) How does the postharvest physiology of tomatoes and (most) melons differ from the rest of the fruit vegetables? How does this affect when they are harvested and how they are handled?

(3 points) Give three reasons why immature fruit vegetables are more perishable than mature fruit vegetables.

a) 

b) 

c)
(11 points) This group of vegetables was divided in the lecture into four subgroups according to their postharvest requirements and handling procedures.

For each subgroup, say something about their relative, a) respiration rate; b) susceptibility to water loss; c) recommended storage temperature & relative humidity; and, d) curing.

a)

b)

c)

d)
(2 points) (T / F) Cut flowers benefit from the fact that all can be stored and shipped near 0°C.

(2 points) What is the one (1) feature of potted ornamental plants that is notably different from fruits, vegetables, AND cut flowers?

(2 points) What is the one (1) feature of both cut flowers AND potted ornamental plants that is notably different from fruits and vegetables?

(2 points) For cut flowers, list one (1) potential advantage of harvesting early in the morning, and one (1) for harvesting near the end of the day.

- Early morning:

- End of the day:

(3 points) What can be done to prevent/remove air embolisms that might form in cut flowers?
(10 points) List five negative consequences of wounding fresh fruits and vegetables during the preparation of fresh-cut products, and indicate how each of these are overcome so that high quality product is delivered to the consumer.

a) 

b) 

c) 

d) 

e) 

(1 point) True or False? The majority of fresh-cut vegetables and fruits are marketed in MAP. (circle one)
FINAL EXAM
POSTHARVEST HORTICULTURE

(101 points) SYNTHESIS QUESTIONS

(MAR Questions – 42 points)

(40 points) Design a postharvest handling system (from harvest to sale at destination markets) for the following hypothetical perishable horticultural commodity. Include why you would choose various steps/procedures in order to justify the corresponding time/money costs. Include in your answers any assumptions that you must make to justify a particular procedure. Be as thorough and specific in your answers as possible!

Commodity Name: Thing-a-ma-bob (TAMB).

Description: A large (~2 kg), round climacteric fruit that is grown in the tropics. Respiration tends to be low until the onset of the climacteric at which time there is a burst of respiration and ethylene production and rapid softening. Before ripening, the fruit is relatively firm. After ripening, the fruit contains high soluble sugars and a good balance of acids that make the fruit extremely popular with European customers. The peel tends to be fairly thick, which can inhibit gas diffusion inside the fruit. Optimum storage and transportation temperatures (not yet defined) appear to vary depending on the time of the year. Accordingly, maximum shelf-life of unripe fruit varies significantly, but has been reported to be as long as 8 weeks.

Discuss each of the following (4 points each):

When to harvest:

Likely method of harvest:

Packinghouse packing vs. field packing:
Likely packinghouse operations:

Decay control measures:

Potential physiological disorders to prevent:

Cooling practices:

Likely optimum storage and shipping conditions (temperature and relative humidity):

Compatibility with other commodities:

Likely best means of transport:

(2 points) Commodities with lower surface to volume ratios tend to lose water (faster/slower; circle one) and are (more/less; circle one) likely to have problems with adequate gas exchange to internal tissues than commodities with higher surface to volume ratios.
(10 points) Draw a figure that illustrates the effect of temperature (x-axis: 0 to 40°C) on the relative rate of deterioration (y-axis: 0 to 100) of harvested horticultural crops. The figure has to apply to all types of horticultural crops.

(20 points) You should be able to predict the postharvest behavior of the following crops based on your knowledge of the general groups to which they belong. For each crop, address its relative 1) perishability, 2) respiration rate, 3) water loss, and 4) susceptibility to mechanical damage; also, provide 5) its optimum storage temperature. (5 points for each crop)

a) Surinam cherry (nonclimacteric tropical fruit)

b) Okra (immature subtropical fruit-vegetable)
c) Pomegranate (nonclimacteric subtropical fruit)

d) Freesia (temperate cut flower)

(10 points) The small fruits and the leafy & succulent vegetables are the two groups of horticultural crops that are most likely to be field packed. What characteristics do they share that make field packing feasible?
(10 points) Tomato and citrus fruits are both sometimes treated with ethylene after harvest. Briefly describe the purpose of the ethylene treatment for each fruit and point out at least one similarity and one difference between the effects of ethylene on each.

(3 points) Mature climacteric fruits that are sensitive to chilling temperatures exhibit a unique symptom of chilling injury (i.e., no other type of horticultural crop exhibits this chilling injury symptom). What is this symptom that is only seen in chilled, mature climacteric fruits and under what conditions is it revealed?
(6 points) A wholesale distribution center (DC) holds all of its produce items at a compromise temperature of 5°C between their arrival at the DC and when they are shipped out to the retail stores that the DC serves. The DC general manager states (real quote), “I know that the USDA recommends that different produce items should be held at different temperatures, but we do not see any quality problems as a result of our practice.”

Why is this practice wrong – what is it that they are missing?