PLSC 422 - Greenhouse Production and Management
Exam I
March 13, 2008

GUIDELINES FOR EXAM I

I. COMPOSITION

1. Essay questions (8 questions, 5 points each)..... 40 points
2. Short answers, matching or fill-in type (14 questions, various points)..... 40 points
3. Multiple choice and true/false (10 questions, 2 points each).....20 points

Total *100 points*

II. **SUGGESTED AREAS OF STUDY**

A. **Introduction** (Chapter 1, lectures)

1. Define 'greenhouse' and 'controlled environment' agriculture.
2. Describe various components of greenhouse management.
3. Know 6 general characteristics of greenhouse business as an agricultural production system.
4. Classification of floricultural crops and their relative importance.
5. Know the square footage of acre and hectare.
6. Flower markets and market trends.

B. **Greenhouse Construction** (Chapter 2, lectures)

1. Discuss various environmental and geographic considerations for establishing a greenhouse business (climatic factor, water supply, etc.). Be specific for each.
2. Name the structural parts of a standard greenhouse.
3. Recommendations on greenhouse orientation.
4. Contrast lean-to houses and free-standing single span houses.
5. Advantages and disadvantages of uneven-span greenhouses.
6. Kinds of even-span trusses.
7. Reasons for using vinary and mansard houses in northern latitude.
8. Advantages and disadvantages of Gothic arch and quonset greenhouses.
9. Types and characteristics of multispan greenhouses.
10. What is meant by a contiguous greenhouse?
11. New and experimental designs of greenhouses.
12. Know various kinds of greenhouse design loads.
13. Recommendations for snow and live loads in greenhouse construction.
14. Function, types, and construction of greenhouse foundation.

C. Greenhouse Covering Materials (Lab exercises)

1. Advantages and disadvantages of using various kinds of glazing material (glass, polyethylene, PVC, PVF films, plexiglass, fiberglass, Exolite, Lexan).
2. Contrast solar transmittance and thermal transmittance.
3. Optical properties of coverings: know the fate of light passing through a glazing material.
4. Define percent light transmission.
5. Discuss advantages of using corrugated FRP over flat FRP.
6. Relative price comparisons for various glazing materials available in current market.

D. **Benches and Containers** (Lab exercises)

1. Four basic requirements for greenhouse benches.
2. Contrast closed benches vs. open benches, flat benches vs. stepped benches.
3. Know the advantage of raised benches over ground beds.
4. Know four different methods of bench arrangement commonly used in a greenhouse: include space efficiency, advantages, and disadvantages.
5. Advantages and disadvantages of using various bench construction materials (cement-asbestos, wood, welded wiremesh screen, wooden lath, expanded metal).
6. Selection of wood materials and wood preservatives.
7. Know merits of using clay pots and plastic pots.
8. Calculation of bench areas, spacing pots, and estimation of potting soil volume and cost.
9. Know the difference between standard pots and azalea pots.

E. **Business Management** (Chapters 17 and 18, lectures)

1. Know the organizational structure of greenhouse management system.
2. Know 5 different kinds of fixed expenses.
3. Contrast fixed variable costs and variable (direct) costs.
4. What is meant by depreciation?
5. Examples of variable (direct) expenses.
6. Know how to calculate production costs (per week, per ft^2 and per pot).
7. Determination of prices which will allow predetermined profit margins.
8. Concept of crop programming.
9. Five important factors that affect decision making in crop programming.
10. How one can minimize the cost production? Suggest different ways to reduce production costs (i.e., reduction in overhead costs, alteration of cultural programs, etc.).
11. Know about importance of adjusting pot spacing for the reduction of production costs.
12. Effective labor management (leadership, manager-employee relationship, working conditions) (pp. 633-641, textbook) the
13. Function and content of a balance sheet.
14. Know the terminology - liquidity, solvency, investment turnover, profit margin.
15. List laws a greenhouse manager should be familiar with in running a greenhouse.

F. **Greenhouse Heating** (Chapter 3, lectures)

1. Importance of diurnal temperature fluctuations.
2. Factors that affect determining optimum greenhouse temperatures (age of plants, grower's objectives, etc.).
3. Know the units of heat (BTU, cal), heat of vaporization, horse power and BTUs.
4. Three ways of heat energy movement (conduction, convection, radiation).
5. Problems associated with greenhouse condensation.
6. Know the characteristics of fuels used in greenhouse heating (kinds, heat value, combustion efficiency, advantages and disadvantages).
7. Advantages and disadvantages of the centralized and localized heating systems.
8. Know how to calculate BTU heat loss per hour.
9. Know how to calculate BTU requirement, amount and cost of fuel needed per year.
10. The concept of heating degree days.
11. Various measures for minimizing heat loss from greenhouse.
12. Advantages and disadvantages of using polyethylene thermo-blankets (false ceiling) for northern greenhouses.

G. **Greenhouse Cooling** (Chapter 4, lectures)

1. Five objectives of greenhouse cooling
2. Know 6 different methods of greenhouse cooling
3. Know the difference between dry-bulb and wet-bulb temperatures.
4. Why is the wet-bulb temperature important in greenhouse cooling?
5. Principles of the pad-and-fan cooling evaporative cooling system.
6. Know the difference between the cross-flow and longitudinal-flow system of arranging a pad-and-fan cooling system.
7. Know how to calculate CFM requirements for greenhouses with known dimension and adjustment factors.
8. Maximum allowable distance between exhaust fans installed on the same greenhouse wall.
9. Under what conditions the velocity (F_{vel}) is used in place of the house factor (F_{house})?
10. Importance of using automatic shutters on the fan.
11. Advantages and disadvantages of using aspen pad and Kool-cel pad.
12. Know how to arrange pad and fan locations for known summer wind directions and interfering adjacent buildings.
13. Know how to determine the required pad area and the heights for known CFM requirements
14. What are the advantages of using horizontal pads over vertical pads?
15. Why are overhead baffles used in longitudinally arranged evaporative cooling systems?
16. Know the components of the pad-and-fan evaporative cooling system.
17. Know how ventilation system works for greenhouses installed with the fan-jet system.
18. Discuss how a package evaporative cooler works for hobby greenhouses and how it is installed (pp. 179-180, textbook).