Exam 1
Aquaculture Production
January 4, 2012

Name: _____

Each question is worth 2 points except where labeled differently.

1. True or **False**: Even if the water quality is not the best, any water can be used and modified to meet the needs of the cultured species.

2. True or **False**: An investor has located a site for building an aquaculture farm that has plenty of water during the rainy season when he visited the site. He will fill his ponds through canals using the water from rain-fed springs. Based upon this site visit, he will have adequate water to produce fish throughout the year, harvesting a pond every 3 months.

3. True or **False**: A farmer wants to grow a fish and will be selling them to live markets in adjacent states. Because it is legal where he is growing it, he does not need any permits.

4. True or **False**: A farmer has a well with salinity of 4 ppt. He wants to grow a shrimp that grows well at 3-5 ppt salinity. Since his water is within the salinity range for culture, it will be adequate for shrimp culture.

5. What is the main aquatic species (or common name) grown in fresh water in Vietnam? **Tra catfish (Pangasianodon hypophthalmus).**

6. Which aquatic species is the major one grown in salt water in Vietnam? **Shrimp (white and tiger)**

7. What are the two highest variable (operating) costs associated with aquaculture? **Feed and seed**

8. The price of tilapia based on fish prices sampled in the market during December was determined to be adequate for making a profit. What else should a potential investor evaluate?

   a) Product form & size
   b) Alternative products
   c) Product seasonality
   d) Pricing through year
   e) All of the above

9. For encouraging photosynthesis, which component of alkalinity is important?

   a) hydroxide b) sodium c) **bicarbonate** d) calcium e) magnesium

10. Lime should never be used at the same time that fertilizers are added, because it can:

    a) Precipitate out calcium

b) Remove alkalinity
c) **Precipitate out phosphorus**
d) Increase alkalinity
e) Decrease pH

11. When removing inorganic turbidity, which of the following is the most effective?

a) alum b) gypsum c) lime d) calcium chloride e) sodium chloride

12. Why is it important to measure alkalinity of water when evaluating a site for pond production for freshwater fish culture? Two reasons: **Low alkalinity can lead to problems with large fluctuations in pH, especially high pH levels, which can be very stressful and even lethal on fish. Very low alkalinity (<20 mg/L) can reduce nutrient (P) availability.**

13. True or **False**: An optimal fertilizer has a low C:N and small particle size. This is why organic fertilizers are the best type of fertilizer.

14. Liquid fertilizers should be:

a) added directly by spreading evenly over the pond
b) **diluted by adding fertilizer into 5-10 parts water before spreading over pond surface**
c) added directly at one end of the pond
d) diluted by adding 5-10 parts water to fertilizer and then added to one end of the pond
e) diluted by adding 5-10 parts water to fertilizer and then spread evenly over the pond

15. (4 pts) How much cottonseed meal (41% protein) is needed to achieve 16 kg N/ha in a 1-ha pond

a) 24.4 kg b) **244 kg** c) 39 kg d) 6.6 kg e) 66 kg

16. **True** or False: Cyanobacteria are associated with nutrient rich ponds with thermal stratification under stable conditions.

17. What are the two main pathways for removing ammonia in fish ponds? **bacteria and algae bloom (phytoplankton)**

18. A farmer wants to remove turbidity but does not have access to chemicals like alum. How much manure would you suggest using to remove inorganic turbidity?

a) 20 kg/ha b) 100 kg/ha c) 200 kg/ha d) **1000 kg/ha** e) 2000 kg/ha

19. (5 pts) A farmer plans to sell tilapia weekly to the market and the market size is 100 mt/year. He has the following information and wants to know what size ponds to build?
    - Average production 5,000 kg/ha
    - Cycle 12 months from 20 g fingerlings to 0.5 kg fish
    - Average survival 85%
    - Average FCR 2:1

- Maximum daily feeding rate 100 kg/ha/day
- Maintain DO > 3.0 mg/L
- He will harvest completely when he sells his product.

a) **0.4 ha** b) 20 ha c) 4 ha d) 100 ha e) 66 ha

20. Insect treatments in fish fry ponds should be done:

a) 5-7 days after stocking
b) 5-7 days before filling the pond
c) On the day of stocking
d) Weekly
e) **5-7 days prior to stocking**

21. True or **False**: Rotenone can be applied directly on one end the pond and allowed to spread by the wind.

22. What is the main way that ammonia is controlled in tra catfish ponds? **Water exchange**

23. What is the main problem with tra catfish fillets, especially for the export market? **Yellow fillets**

24. Breakdown of rotenone upon application to water is rapid and is NOT dependent upon?

a) temperature b) alkalinity c) light d) oxygen e) **hardness**

25. What is the minimum ratio of potassium permanganate to rotenone used to treat water to detoxify rotenone?

a) **1:1** b) 3:1 c) 5:1 d) 10:1 e) 7:1

26. What is the driving force for commercial aquaculture? **market**

27. The purpose of aerating the diesel fuel/oil mixture 24 hours prior to treating ponds for insects is to:

a) Add oxygen
b) **Drive off toxic volatile hydrocarbons**
c) Better mix them
d) Remove carbon dioxide

28. Vietnam and Cambodia have similar climates for growing tra catfish; however, a farmer in Cambodia cannot stock at the high densities and get the same rates of production like Vietnam, even when they have access to the same feeds? What is the limiting factor? **Water quantity**

29. In Cambodia, the Fisheries Administration is concerned about tra catfish fingerlings coming from Vietnam even though tra is native to Cambodia? What is their concern? **Differences in strains between Vietnam and Cambodia**

30. When looking at fertilizer composition, phosphorus is listed as a percentage of?

a) PO_4 b) **P_2O_5** c) HPO_4 d) P e) PO_3

31. In alternative (rotational) rice-shrimp (marine) culture, during which season are the shrimp grown? **Dry**

32. In alternative (rotational) rice-freshwater prawn culture, during which season are the prawns cultured? **Rainy/wet**

33. Granular fertilizers should be:

a) broadcast evenly over the pond
b) broadcast next to an aerator or paddlewheel
c) **placed in a porous sack on a raised platform at least 15 cm below the surface**
d) placed in a porous sack on the pond bottom
e) added to the pond soil prior to adding water

34. (4 pts) How much triple superphosphate (0-46-0) must be added to a 1-ha pond to achieve 5 kg P/ha?

a) 35 kg b) **25 kg** c) 11 kg d) 2.3 kg e) 7.4 kg

35. (4 pts) Given the following assumptions, how many hectares of ponds are needed? **20 ha**

- Average production 5,000 kg/ha
- Cycle 8 months from 20 g fingerlings to 0.5 kg fish
- Average survival 85%
- Average FCR 2:1
- Maximum daily feeding rate 100 kg/ha/day
- Maintain DO > 3.0 mg/L
- Market of 100 mt

36. (4 pts) Given the above assumptions, how many fingerlings are needed? **235,294 or ≈ 235,500 fingerlings**

YOUR CLIENT: Please advise based upon the information given.

37. (5 pts) Based upon the hand illustration, what are the 5 components of commercial aquaculture?

Farm management
Feed quality and quantity
Stock (Seed) quality
Water quality
Market

38. (5 pts) You have been asked by a client to evaluate a site to determine the feasibility of growing a particular freshwater fish to sell in the food market. He wants to grow the fish in ponds. List 5 things that need to be determined to assist you in your evaluation. Focus on general categories, not specifics within each category.

Legality of Fish
Permits and regulations
Water Quantity
Water Quality
Suitability of Soil for Pond Construction
Market Size and Structure
Biology of Fish
Suitability of Size of Site (Adequate Space, etc.)
Power Supply
Local Conflicts (User, Contamination)
Costs

39. (3 pts) List 3 causes of water loss in fish ponds. **Losses from seepage, evaporation, overflow, or regulated discharge**

40. (4 pts) You are building a 100 hectare farm (total water area) with an average water depth of ponds is 1.5 m. You need to fill all ponds within 4 weeks. Single well can pump 4,000 L/minute. How many wells do you need? **At 1,500,000,000 L and 4 weeks, need 37,202 L/minute or 9.3 or 10 wells**

BONUS:

41. (3 pts) You need to treat your pond to eliminate unwanted sunfish prior to stocking catfish in early summer. Your pond is 5 ac with an average depth of 4 ft. You will treat with rotenone (5%). One gallon treats 6-3 acre-feet at 0.5-1.0 ppm. How much will you add (4 pts) and how will you determine when to stock your fish (2 pts)? **At 5 ac and 4 ft deep, that is 20 ac-ft. At the higher dose that is 20 ac-ft/3 ac-ft/gal or 6.7gal needed. At 20 ac-f/6 ac-ft/gal, it would be 3.3 gal.**

Pull a water sample in bucket and hold fish for 24 hours to assess mortality or hold them in cages within the pond. If they survive, then good to stock.