

BAE 103
Energy in Biological Systems

Final Exam - Wednesday, May 2 from 8:00 AM to 10:00 AM
Room 236 of the C.E. Barnhart Building

Study Guide

General Guidelines

You will be required to solve the following problems, to the best of your abilities, on the final exam. Use the problem solving approach as demonstrated in class. Show all work and list any assumptions in setting up the problem. Remember, approximately 90% of the credit will be for setting up the problem in readable form with units that are correct. Numerical answers alone will not be counted! You will be provided with all of the equations, necessary tables, and conversion factors. The exam is comprehensive of the entire course.

Problem Types

1. Determine the surface areas and volumes of geometric shapes.
2. Use the continuity equation to determine how long it takes to fill a tank.
3. Determine the capacity of a screw conveyor.
4. Estimate the thermal efficiency of an internal combustion engine.
5. Approximate the fuel efficiency of a vehicle.
6. Convert between gage and absolute pressures.
7. Size an electric motor to pump water from a well.
8. Use the continuity equation to determine average fluid velocities.
9. Calculate Reynold's Number.
10. Determine the pressure loss in a fluid conduit.
11. Determine the power required to drive a pump for moving fluid against a pressure head.
12. Calculate the energy associate with changes in state of water.
13. Estimate the length of time that ice will maintain the temperature of a cooler.

14. Determine any five of the factors depicted on a psychrometric chart given the other two.
15. Track heating, cooling, humidification and dehumidification processes on the psychrometric chart.
16. Determine the rate of heat loss from a surface exposed to free or forced convection.
17. Determine surface temperatures of building components given ambient air temperatures.
18. Estimate the heat loss through a building.
19. Determine the economic benefit of adding insulation to a residential structure.
20. Estimate energy transfer of refrigerants within the refrigeration cycle (COP).