SAS
S07

BAE 103
Energy in Biological Systems

Problem Set No. 14
Heat Transfer Through Walls, Surface Temperatures
Due Date: Monday, April 9

14.1 The walls of a storage warehouse are constructed of 12 in. thick lightweight concrete block. If the building is 36 ft. wide by 100 ft. long and the walls are 10 ft. high, what is the total rate of heat loss through the walls when the inside temperature is 60^oF and the outside air temperature is 0^oF? Assume there are no door or window areas in the walls.

14.2 Under the conditions in problem 14.1, what is the approximate interior wall surface temperature?

14.3 If the inside walls of the above warehouse are covered with 1 in. thick rigid expanded polystyrene insulation, what will be the inside wall surface temperature (temperature of insulation surface next to air)?

14.4 The walls and ceiling of a walk-in refrigerator which is 10 ft. by 15 ft. by 8 ft. are constructed as follows:

1/2 inch fir plywood on outside
6 inches expanded molded polystyrene
1/16 inch aluminum

Determine the total thermal resistance (R_t) of the refrigerator assuming it is located on the inside portion of a grocery store.