

M.E. DEGREE EXAMINATIONS: NOV/DEC 2010

Third Semester

ENERGY ENGINEERING

EEG559: Energy Conservation in Buildings and HVAC

Time: Three Hours

Maximum Marks: 100

**Answer ALL Questions:-
PART A (10 x 2 = 20 Marks)**

1. Define the term psychrometry
2. Define dry bulb temperature and wet bulb temperature
3. List few packages for carrying out thermal design of buildings
4. Define equivalent temperature difference
5. What is visual ability?
6. What are the various forms of lighting?
7. What are the factors that determine thermal comfort?
8. Define illumination
9. Differentiate fans and blowers
10. Define energy efficient motors

PART B (5 x 16 = 80 Marks)

11. a) (i) Explain the factors that affect thermal comfort. (8)
- (ii) Explain summer air conditioning system with a neat sketch. (8)

(OR)

- b) Following data refers to an air conditioning system to be designed for an industrial process

Outside conditions = 30 °C and 75% relative humidity

Required conditions 20°C and 60% relative humidity

The required conditions are achieved first by cooling and dehumidification and then by heating. If 20 m³ of air absorbed by the plant every minute, determine

1. Capacity of the cooling coil in tones
 2. Capacity of heating coil in kW
 3. Amount of water vapour removed per hour.
12. a) (i) Explain in detail how building energy performance is evaluated. (8)

- (ii) Discuss briefly the different types of heat loads which have to be taken into account in order to estimate the total heat load of a large restaurant for summer air conditioning. (8)

(OR)

- b) The design data for an air-conditioning plant of a restaurant is given below:

Outdoor design conditions	= 35°C DBT and 24°C WBT
Indoor design conditions	= 27°C DBT and 55% RH
Seating capacity of the restaurant	= 50
Latent Heat gain per person	= 44 W
Latent heat gain from meals per person	= 6 W
Sensible Heat gain per person	= 58 W
Sensible heat gain from meals per person	= 3.5 W
Number of service employees	= 5
Latent heat gain per employee	= 75 W
Sensible heat gain per employee	= 58 W
Sensible heat gain from outside	= 8.14 W
Sensible heat gain from inside equipment	= 2.9 W
Latent heat gain from inside equipment	= 0.7 W
Rate of infiltrated air	= 400 m ³ /h
Rate of fresh air supply	= 1600 m ³ /h
Minimum temperature of air supplied to room	= 17°C DBT

The fan is situated before the conditioner and has a motor of 11kW.
Calculate the Room sensible heat factor.

13. a) (i) Explain in detail about energy efficient lighting system. (8)
(ii) Explain day lighting and the factors that facilitate day lighting. (8)

(OR)

- b) (i) Explain lighting economics and aesthetics. (8)
(ii) Describe the impacts of lighting efficiency. (8)

14. a) Explain parameters affecting ventilation and air quality and also give the requirements for air conditioning. (OR)
b) Explain the importance of energy audit for buildings and energy management options in commercial buildings.

15. a) List the measures for efficient pumping system operation and describe the factors that greatly affect the pumping system efficiency. (OR)
b) Explain the energy conservation opportunities in
1. Fans and blowers.
2. Refrigerating machines.
