GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER–II(New course) EXAMINATION(Remedial) –WINTER 2015

Subject Code: 2721003   **Date:10/12/2015**
Subject Name: Advanced Air Conditioning
Time:2:30 Pm to 5:00 Pm   **Total Marks: 70**

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1   **(a)** Write down the procedure for calculating heat gains through building structure.   07

      (b) Define the term effective temperature and explain its significance in the design of air conditioning system.   07

Q.2   **(a)** Classify the various types of Air-conditioning systems.' Also discuss in brief about the factors affecting the selection of the Air conditioning systems.   07

      (b) Describe dual duct system with reheat cycle with psychometrics analysis.   07

OR

      (b) An air conditioned auditorium is to be maintained at 27^0c DBT and 55% RH. The ambient condition is 39^0c DBT and 28^0c WBT. The total sensible heat load is 120000 KJ/h and the total latent heat load is 45000 KJ/h. 60% of the return air is recirculated and mixed with 40 % of makeup air after cooling coil. The condition of air leaving the cooling coil is 17^0c. determine :   07
        1. Room sensible heat factor,
        2. Condition of air entering the auditorium,
        3. Amount of makeup air,
        4. Apparatus dew point,
        5. By pass factor of the cooling coil.

Q.3   **(a)** Explain the different types of pressure involved in duct system.   07

      (b) Discuss the various fan similarity laws.   07

OR

Q.3   **(a)** List down only the various types of psychometrics Processes. Explain in detail about cooling and dehumidification Process with representation on schematic Psychometrics diagram for the same.   07

      (b) The following data relates to the offices air conditioning plant having maximum seating capacity of 25 occupants: 07
        Outside design conditions =34^0c DBT, 28^0c WBT
        Inside design conditions = 24^0c DBT, 50%RH
        Solar heat gain =9120 w
        Latent heat gain per occupants = 90 w
        Lightening load = 2300 w
        Sensible heat load from other sources = 11630 w
        Infiltration load = 14 m^3/min
     Assuming 40% fresh air and 60% of recirculated air passing through the evaporator coil and the by pass factor of 0.15, find the dew point temperature of the coil and capacity of the plant.

Q.4   **(a)** Compare different methods of air conditioning duct design. Why are dampers required in some systems?   07

      (b) With the neat sketch explain the different factors affecting grill performance.   07

OR

Q.4   **(a)** What is the purpose of using cooling tower? Which factors influencing cooling tower   07

performance?

(b) A fan diameter 0.7 m is running at 1500 rpm delivers $140m^3$/ min of air at 15 °C **07** against 75 mm of water of total pressure when its total efficiency is 86%. Determine the volume of air delivered , total pressure developed and power consumed
   1. If air temperature is 50 °C
   2. The air temperature is 50 °C and fan speed is increased to 1700 rpm.

Q.5 **(a)** Explain the sources of noise in air conditioning systems. What are the important methods adopted for noise control. **07**

(b) Explain with a neat sketch how outdoor air quantity is controlled. **07**

OR

Q.5 **(a)** State the importance of air filter in air conditioning. What are the factors to be considered for selection of air filter? **07**

(b) Draw a line diagram to illustrate the control of dampers, cooling coils, heaters, and fans with help of thermostats and humidistats in case of year air- conditioning system. **07**