

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E –II<sup>st</sup> SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1721003****Date: 10/07/2012****Subject Name: Advanced Air-Conditioning****Time: 10:30 am – 13:00 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) Explain how load calculation of following differ from one another: **07**
- Gymnasium
  - Library
  - Cold store
- (b) The outdoor summer design condition for a bank for 100 persons at place is  $T_{db}= 310$  K. The required inside conditions are  $T_{db}=295$  K and relative humidity is 60%. The room sensible heat is 400,000K J/ kg. The room latent heat is 2, 00,000 K J/ Kg. Ventilation requirement per person is 0.0047 m<sup>3</sup>/hr. The bypass factor is 0.15. Evaluate (a) Grand total heat (b) ESHF (c) apparatus dew point (d) volume flow rate of dehumidified air. **07**
- Q.2** (a) Explain following terms pertaining to cooling tower: **07**
1. Tower characterization
  2. Cooling tower approach
  3. Cooling tower efficiency
- (b) A mini cold storage is required to preserve 20 tons of fish at 260 K. There are two attendants, four 40 W bulbs, one 200 W blower. The meat is to be processed to the storage condition in 36 hours. The cold storage size is 8 x 4 x 3 m high. The overall heat transfer coefficients for the walls and ceiling are 4 and 2 k J /m<sup>2</sup>. hr. K. The ambient condition is  $T_{db}=318$  K and  $T_{wb}=302$  K. The heat release due to respiration is 60 K J /ton –hr. The ventilation air is 20 m<sup>3</sup>/ ton hr. calculate the capacity of the refrigeration system to be procured. **07**
- OR**
- (b) A fan diameter 0.7 m is running at 1500 rpm delivers 140m<sup>3</sup>/ min of air at 15 °C 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 **07**
1. If air temperature is 50 °C
  2. The air temperature is 50 °C and fan speed is increased to 1700 rpm.
- Q.3** (a) Compare different methods of air conditioning duct design. Why are dampers required in some systems? **07**
- (b) Write brief note on variable air volumes system. **07**
- OR**
- Q.3** (a) Explain following: **07**
1. Dynamic losses in ducts
  2. Aspect ratio
  3. Duct lay out considerations
- (b) Describe with neat sketches **07**
1. Dual duct VAV
  2. Fan powered VAV system
- Q.4** (a) How are air handling units classified? Differentiate between double skin and single skin AHU's. **07**
- (b) Explain different equations governing thermal exchanges in human body. **07**
- OR**
- Q.4** (a) Explain with a neat sketch how outdoor air quantity is controlled. **07**
- Q.4** (b) Write brief notes on Effective temperature and ventilation standards. **07**
- Q.5** (a) What is noise rating curve? Explain its use with neat sketch? What is an RC curve? Where is it used? **07**
- (b) Explain following terms: diffuser, throw, induction ratio, and drop. **07**
- OR**
- Q.5** (a) Sketch roof top units and explain its working. **07**
- (b) Describe with neat sketches different types of outlets in a theatre. **07**

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