

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1722103****Date: 04-12-2014****Subject Name: Advanced Air Conditioning****Time: 02:30 pm - 05:00 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)** Define the following **04**
1. Dew point temperature
 2. Wet bulb depression
 3. Relative humidity
 4. Degree of saturation

- (b)** Draw the skeleton of psychrometric chart and show on it the various properties of air. **03**

- (c)** With neat sketch and psychrometric chart, describe a dual duct VAV system. **07**

- Q.2 (a)** An outside air supply of 85 m³/min at 35 DBT and 25 WBT is mixed with 170 m³/min of return air from a room at 27°C DBT and 20°C WBT. 75% of this mixture flows through a cooling coil and the balance through a bypass around the coil. The chilled air leaves the coil at 16°C DBT and 15°C WBT. Find the final condition of the mixture of chilled and bypassed air. **07**

- (b)** Explain the procedure for calculating cooling load due to (a) walls/ceiling (b) glass. **07**

OR

- (b)** Explain the construction and working of an induced draught cooling tower. State its merits and demerits. **07**

- Q.3 (a)** Draw operating characteristics of a centrifugal fan with forward curved blades. State its salient features. If the flow gets increased, how are the other parameters altered? **07**

- (b)** A fan gives SP of 290 Pa with a velocity of 800 m/min at its outlet while delivering a quantity of 120 m³/min of air. The inlet SP and velocity are 200 Pa and 500 m/min respectively. Calculate (i) total head developed by the fan (ii) power required if fan mechanical efficiency 75%. **07**

OR

- Q.3 (a)** Define the following terms in relation with air distribution system. **07**

- | | |
|------------|----------------------|
| 1. Grilles | 5. Terminal velocity |
| 2. Throw | 6. Aspect ratio |
| 3. Drop | 7. Register |
| 4. spread | |

- (b)** What is ADPI? Explain the design procedure for outlet selection with the help of ADPI. **07**

- Q.4 (a)** Explain the use of Nomographs and Equivalent Diameter Chart for the design of air conditioning duct. **07**

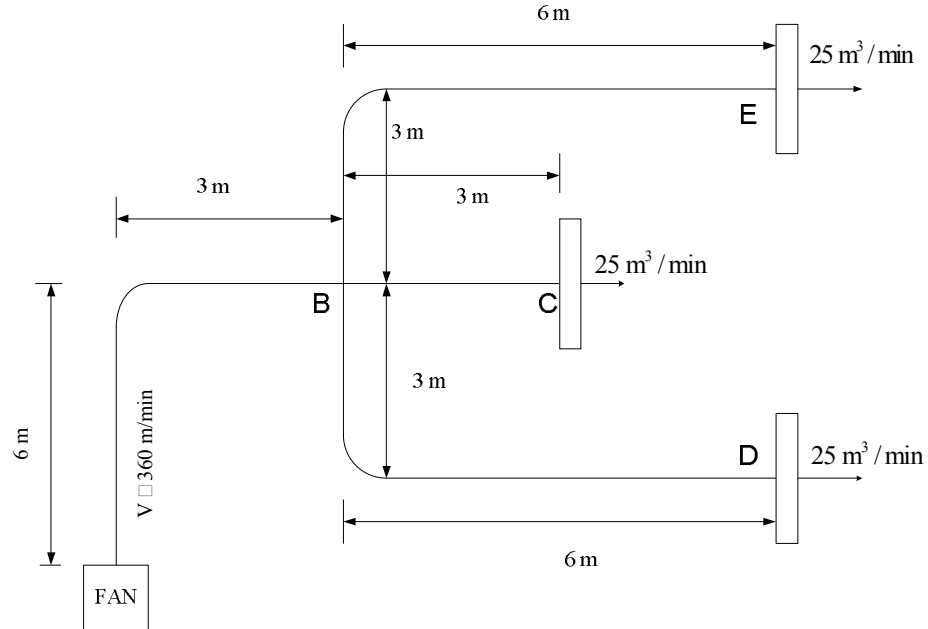
- (b)** Explain the static regain method of duct design. **07**

OR

- Q.4 (a)** Explain the equal friction method of duct design. **07**

- (b)** Figure shows the duct layout. Find the sizes of various duct and maximum **07**

pressure loss by equal friction method. Assume that the dynamic loss at each bend/area change is equivalent to the duct length of 2 m. Velocity of air at fan outlet is 360 m/min. Take $h_f = 0.02(L/D)(V/77.5)^2 Pa$ with usual notations.



- Q.5** (a) With neat sketch, explain the working of electric filter. **07**
 (b) What is a noise rating curve? Explain its use with a neat sketch. **07**
OR
Q.5 (a) Explain the factors governing Effective Temperature. **07**
 (b) What is a clean room? Give detail classification of clean rooms. **07**

