Seat No.: _____ Enrolment No._____

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 m^3/min at 35 DBT and 25 WBT is mixed with 170 m^3/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 m^3/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
2. Throw
3. Drop
4. spread
5. Terminal velocity
6. Aspect ratio
7. Register

(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**

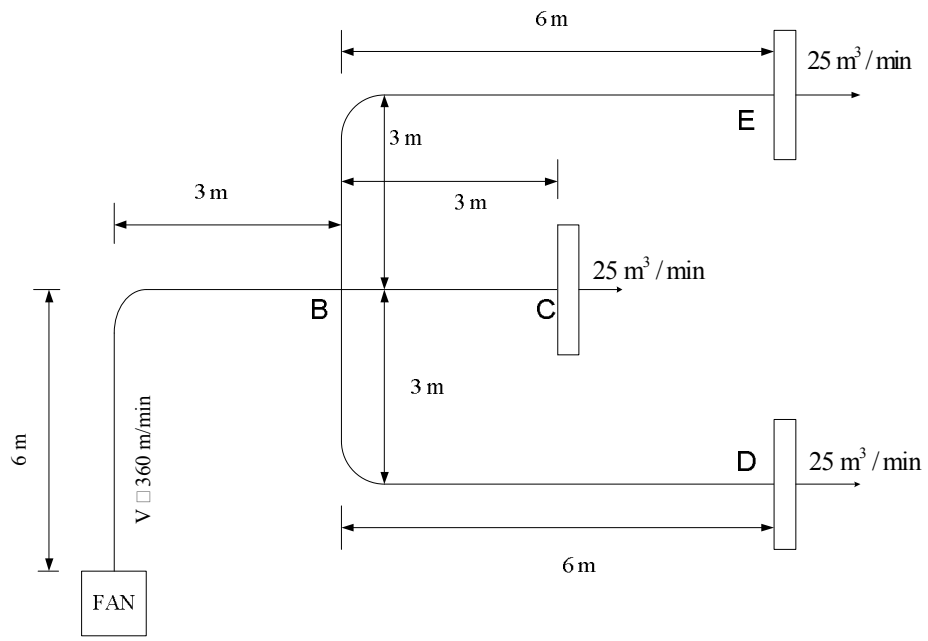
(b) Explain the static regain method of duct design. **07**

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**

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