Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER III–EXAMINATION – WINTER 2015

Subject code: 2732105 **Date: 04/12/2015**

Subject Name: ADVANCED AIR CONDITIONING TECHNOLOGY

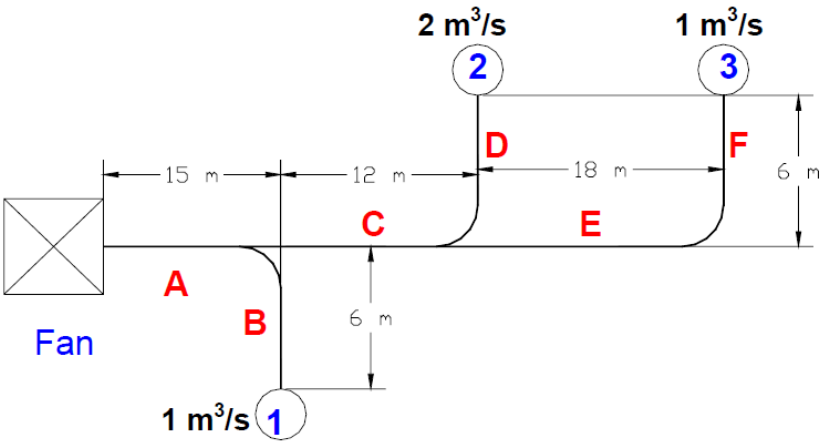
Time: 2:30 PM to 5:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **use psychrometric chart , duct friction chart & table is permitted**

Q.1	**(a)**	Enlist different methods for duct design. Explain static regain methods for duct design.	**07**
	(b)	Describe clean room concept and application of clean room.	**07**
Q.2	**(a)**	Explain the terms RSHF, GSHF, ESHF and bypass factor.	**07**
	(b)	Discuss factor for selection of supply air outlet device.	**07**
		OR	
	(b)	Enlist & Discuss importance of different heat sources for cooling load calculation.	**07**
Q.3	**(a)**	State & Discuss the air distribution device with neat sketch.	**07**
	(b)	Discuss the factors affecting the human comforts.	**07**
		OR	
Q.3	**(a)**	Explain infiltration with reference to cooling load calculation for comfort air conditioning.	**07**
	(b)	An air conditioning system comprising of filter, cooling coil, fan and distribution system uses only fresh air for the purpose of maintaining comfort conditions in summer. The following data is available: RSH=310kW, RLH=100 kW. Outside design condition: 38^0C DBT, 50% RH, inside design condition: 25^0C DBT, 50% RH. and 10% by mass of air supply to the building is outdoor air. If the air supply to the space is not to be at a temperature lower than 18^0C. Calculate (1) maximum amount of air supplied to space in m^3/sec (2) volume flow rate of return air & outdoor air (3) Capacity, ADP, BPF of cooling coil.	**07**
Q.4	**(a)**	Write short note "Central Air Conditioning System".	**07**
	(b)	Discuss the performance characteristic of FC, BC, RC fans. Air conditioning supply fan is operating at 600 rpm against 500Pa and requiring 4.85 kW. It is delivering 540m^3/min at started conditions. In order to handle air conditioning load, heavier than originally planned, more air required. In order to increase the flow to 610m^3/min, what is the new speed, pressure, power?	**07**
		OR	
Q.4	**(a)**	Explain the construction & working of an induced draught cooling tower. State its merits & demerits.	**07**
	(b)	Explain the factors affecting the selection of air conditioning system.	**07**
Q.5	**(a)**	State the different types of filters. Explain with neat sketch explain the working principle of viscous filter.	**07**
	(b)	Define following terms: 1) cooling tower range, 2) Drift, 3) Approach, 4) Effectiveness	**07**
		OR	
Q.5	**(a)**	Describe the terms:1) ADPI, 2) SDEF, 3) Entrainment ratio	**07**

(b) The following figure shows a typical duct layout. Design the duct system using Equal friction method. Take the velocity of air in the main duct (A) as 8 m/s for both the methods. Assume a dynamic loss coefficient of 0.3 for upstream to downstream and 0.8 for upstream to branch and for the elbow. The dynamic loss coefficients for the outlets may be taken as 1.0. Assume velocity 5 m/s for the downstream and branches. Find the FTP required for each case and the amount of dampering required. **07**



****