Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M.E Sem-II Examination July 2010**

**Subject code: 722103**

**Subject Name: Advanced Air Conditioning**

**Date: 07 /07 /2010** **Time: 11.00am – 1.30pm**

**Instructions:** **Total Marks: 60**

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

**Q.1** **(a)** Classify air conditioning systems and explain any one of them in detail. **06**

**(b)** Explain 'bypass factor' in detail for designing an air conditioning system. **06**

**Q.2** **(a)** 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=11.63kW, RLH=2.33 kW. Outside design condition: $28^0$ C DBT, $20^0$ C WBT, inside design condition: $21^0$ C DBT, 50% RH. Temperature of air entering the room = $11^0$ C. Calculate (1) RSHF, (2) Coil BF (3) Load of cooling coil. **06**

**(b)** Explain essentials of cooling tower and factors affecting its performance. **06**

**OR**

**(b)** Explain procedure of 'cooling load calculation' for a residential building. **06**

**Q.3** **(a)** Give detail classification of cooling tower and condenser systems, also state their typical aspects. **06**

**(b)** Explain 'solar radiation' aspects in cooling load calculations of buildings. **06**

**OR**

**Q.3** **(a)** Explain 'equal friction method' of duct designing. **06**

**(b)** Discuss procedure for designing the duct system. Compare various methods used for the same. **06**

**Q.4** **(a)** Explain criteria for selection of location for air distribution devices and outlets for the application of 'hotels and restaurants'. **06**

**(b)** Explain typical designs of air distribution grills and outlets. **06**

**OR**

**Q.4** **(a)** What are essential constraints and important factors for selecting specific kind of air conditioning system? **06**

**(b)** Explain in detail 'ductable split air conditioning system'. **06**

**Q.5** **(a)** Explain AMCA standards for testing and manufacturing of fan systems used in air conditioning. **06**

**(b)** A centrifugal fan has a circular inlet duct 450 mm diameter and a rectangular duct of 450 mm × 375 mm. The static pressure at the fan inlet is 125 Pa and the static pressure at the fan outlet is 250 mm when the fan delivers 110 $m^3$/min and absorbs 1 kW power. Assume standard air, calculate (1) total pressure at fan inlet and outlet, (2) fan total pressure and fan static pressure, and (3) fan total efficiency and fan static efficiency. **06**

**OR**

**Q.5** **(a)** State importance of air cleaning devices and give classification of air filters in detail. **06**

**(b)** What is 'clean room condition'? What are its typical applications? State the role of air conditioning for the same. **06**

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