



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/ DEC 2015

SUBJECT: BUILDING AUTOMATION SYSTEMS [ELE 425]

REVISED CREDIT SYSTEM

Time: 3 Hours

08 December 2015

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitably assumed.
- 1. Give reasons for the following statements
 - a) High performance buildings need not be green or smart, but must be both
 - b) Concept of cascade control significantly reduces lag between error/disturbance and output
 - c) Variable air volume system are more energy efficient that constant air volume system
 - d) In Australia, windows in a building should be ideally facing south
 - e) Network cabling can be reduced up to 50% using DALI protocol for lighting control **10**
- **2A.** What is automation? What are the objectives of automatic control?
- 2B. Elaborate on smith predictor control
- 2C. Explain any one implementation issues of integral term in a PID controller. 03How is it addressed?
- **3A.** Explain the working principle of transit time ultrasonic flowmeter. What are the advantages and disadvantages of this meter? **05**
- **3B.** Write a short note on thermal comfort indices PMV and PPD **03**
- 3C. Sketch the architecture of building management system
- **4A.** What are the different components of air handling unit of a HVAC system? **04** What are their purposes?
- **4B.** Solve the following using psychrometric chart
 - a) The air in the room is at 1 atm, DBT = 30° C, WBT = 25° C. Determine:
 - Specific humidity (humidity ratio), w
 - Enthalpy, h
 - Relative humidity
 - Dew point temperature, Tdp
 - Specific volume, v
 - b) The dry bulb temperature in a room is 24°C and relative humidity is 80%. At what temperature will condensation form on the window?
 - c) Outdoor air at 30°C DB and 24°C WB is to be mixed with return air at 20°C and 40% RH. Find the percentage of outdoor air that must be used if the resulting mixture is to be at 25°C DB.

06

03

04

02

- 5A. What is the significance of the following daylighting terminologies?
 - I. Daylight Factor
 - II. Window wall ratio
 - III. Solar heat gain ratio
 - IV. Azimuth and Altitude
 - V. U-factor
- **5B.** What are the factors affecting daylighting of a building? **05**
- **6A.** What are the benefits of direct digital control? How is it realized? **05**
- **6B.** What are the components of access control? How are biometrics useful? **05** Explain any two biometric system for access control.



Chart 1*b*

05