Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2015 / JAN 2016

SUBJECT: BUILDING AUTOMATION SYSTEMS [ELE 425]

REVISED CREDIT SYSTEM

Time: 3 Hours | 09 January 2016 | 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) Closed loop control of a system does not ensure zero steady state error

b) Feedback trim is ideal along with feed-forward control

c) High performance buildings need not be green or smart, but must be both

d) Dew point temperature is a better measure of humidity in the air than relative humidity

e) Among daylighting matrices, 'Useful Daylighting Index' is better than 'Daylight Factor' **10**

2A. Elaborate on feedforward control structure. What are the challenges faced while designing feedforward controller? **04**

2B. Design a feedforward-feedback control strategy for the following system (Fig. 1) to maintain the temperature of the liquid to the set value.

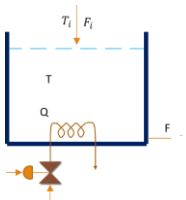

Fig. 1

F_i: Flow rate of fluid flowing in
T_i: Inlet fluid temperature
F: Fluid flow rate at the outlet
T: Temperature to be controlled
Q: Heat input

03

2C. Explain any one implementation issues of integral term in a PID controller. How is it addressed? **03**

3A. Explain the working principle of hot wire anemometer. What are the advantages and disadvantages of this meter? **05**

3B. Write a short note on thermal comfort indices – PMV and PPD **03**

3C. What are the factors affecting thermal comfort of a human body? **02**

4A. What is a heat pump? How does it work? **04**

4B. Solve the following using psychrometric chart

a) The dry bulb temperature and %RH of the ambient air is 18°C and 50 respectively. Using heater, the wet bulb temperature is increased to 15°C. Find the new relative humidity and change in enthalpy

b) The dry bulb temperature and %RH of the ambient air is 30°C and 70 respectively. Using dehumidifier, the moisture content in the air is brought down to 10gm/kg of dry air. Find the new relative humidity and change in enthalpy.

c) The air emerging from a dryer, with an exit temperature of 38°C, passes over a surface which is gradually cooled. It is found that the first traces of moisture appear on this surface when it is at 28°C. Estimate the relative humidity of the air leaving the dryer **06**

5A. What is the significance of the following daylighting terminologies?

I. Daylight Autonomy

II. Window wall ratio

III. Solar heat gain ratio

IV. Azimuth and Altitude

V. U-factor **05**

5B. Explain the three types of daylight control available commercially **05**

6A. What are the benefits of direct digital control? How is it realized? **06**

6B. What is Intrusion Detection System? What are NIDS & HIDS? What are their roles? **04**