Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

II SEMESTER M.TECH (ESM/PED) END SEMESTER EXAMINATIONS, APRIL - MAY 2017

SUBJECT: BUILDING AUTOMATION [ELE 5233]

REVISED CREDIT SYSTEM

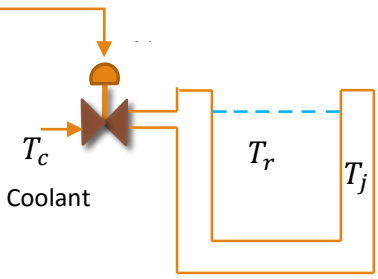
Time: 3 Hours **Date: 27, April 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions
- Missing data may be suitably assumed
- Psychrometric chart shall be supplied

1A. Discuss any two techniques used for controller setting computation ***(05)***

1B. What are the drawbacks of feedback control structure? How are they addressed using feedforward control? Configure cascade control structure to control the reactor temperature for the system given in Fig. 1B



$T_C - Coolant\ Temperature$
$T_r - Reactor\ Temperature$
$T_j - Jacket\ Temperature$

Fig. 1B ***(05)***

2A. What is metabolic rate? What are the assumptions made to calculate human body area? What are the factors influencing metabolic rate? ***(04)***

2B. With neat diagram, explain the working of Coriolis mass flow meter. Mention any two major advantages of this meter ***(04)***

2C. How does Intrusion Detection System work? Give examples ***(02)***

3A. With neat diagrams/blocks, explain how CAV and VAV systems work ***(04)***

3B. A heating coil raises the temperature of air flowing through it from 15°C to 40°C. If 120 kg per minute of air flow through the heater, how much heat must be supplied to the air per hour? (Specific heat of water = 4.18 kJ/kg. K.) ***(02)***

3C. Solve the following using psychrometric chart

i) The air emerging from a dryer, with an exit temperature of 40°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 25°C. Estimate the relative humidity of the air leaving the dryer

ii) Calculate the rate of thermal energy required to heat 5 m^3/s of outside air at 30°C dry bulb temperature and 80% relative humidity to a dry bulb temperature of 40°C. ***(04)***

4A. Write a short note on daylight matrices ***(04)***

4B. Write a short note on DALI. Mention its advantages ***(04)***

4C. What is a biometric security system? How are they advantageous over other security systems? ***(02)***

5A. What are the factors that affect development of fire? In which regions do the dominant wavelengths of fire exist? ***(03)***

5B. What is direct digital control? How is it realized? ***(04)***

5C. Write a short note on Raspberry Pi. What is the advantage of using Arduino as slave and Raspberry Pi as master? ***(03)***