Mechatronika mérnök mester szak, Intelligens épületek és Intelligens terek specializáció, záróvizsga témakörök, 2020-21-2 szemesztertől.

State exam topics, from semester 2020-21-2, Intelligent buildings and Intelligent Spaces Specialisation, Mechatronics MSc

V1.0 2021.03.17. Dr. Szemes Péter Tamás

Épülettechnikai rendszerek és rendszerelemek:

1. Hidraulikai méretezés veszteségei
2. Szivattyú soros és párhuzamos kapcsolása
3. Hőcserélők
4. Hőszivattyúk
5. Kondenzációs gázkazán

Épületfizika:

1. Épületszerkezetek hőátbocsátása, követelmények
2. Nedves levegő állapotjelzői
3. Hőhidak, vizsgálata
4. Felületi lecsapódás, kapilláris kondenzáció
5. Közel nulla épületek hőveszteségei és hőnyereségei

Building Service Systems and Elements:

1. Hydraulic loss calculation
2. Pumps connected in parallel and in serial
3. Heat exchangers
4. Heat pumps
5. Condensing boilers

Building Physics:

1. Building structures heat transfer coefficient, requirements
2. Psychrometric properties of moist air.
3. Thermal bridge, examination
4. Surface and capillary condensation
5. Heat losses and gains for nearly zero energy buildings


ÉPÜLETINFORMATIKA

1. Térinformációs rendszerek fogalma és alkotóelemei.
2. Mutassa be a földi helymeghatározásban használt koordináta rendszereket!
3. Vezesse végig a modellalkotás folyamatát!
4. Mutassa be az Energy Plus épületirányítási szoftver képességeit!


BUILDING MANAGEMENT SYSTEMS

1. Concept and components of spatial information systems.

2. Describe the coordinate systems used in ground positioning.
3. Describe the modeling process.
4. Demonstrate the capabilities of Energy Plus building management software.

Building Automation:

1. Discuss BMS and its major role in a building, Describe the BMS suppliers and Integrators, Enlist system components in terms of (a) Hardware (b) Field devices (c) Networks. What are the major benefits of BMS over Stand-alone Control? What is the major difference between the BMS control loop tuning and Optimisation?

2. Discuss and define the main parts of the Building Control Element? Prepare a flowchart that consists of a Controller "maintaining the room temperature"; Having the following scenario: The controller is attempting to maintain the room temperature at a set point. A low room temperature results in an increased output from the heater, which then raises the room temperature. This increase is detected by the sensor and transmitted to the controller, which alters its output accordingly to reduce the difference between the setpoint and the measured value of the controlled variable.

- Include all required components to prepare the flowchart (Controller, Actuator, Sensor, Controlled device, Signal conditioner, Controlled variable, Transmitter, Load/Process)

3. In BMS to extend the already established older system with the new one, which technique or protocol is applied? Elaborate on the specifications of that particular protocol and at which level this protocol is being implemented in a hierarchy. In different levels for communication inside a Building Automation System, there are several protocols used; kindly mention at least 3 levels of BAS and also the communication protocol utilized in it.

4. Define the Conceptual BAS controller along with its diagram consisting of BACnet protocol to implement the following scenario: An air handling unit in your building received a signal to go occupied, this signal would be sent over the network on a BACnet binary variable (or BV). This would then cause the fan to turn on (and anything else logically that needs to happen). The same BV that is used to send the controller the occupancy command is also read from the controller to see if the controller received the command and went occupied.

5. Discuss the working principle of Shell and Tube Heat Exchanger in terms of all the components and their purpose of usage in it. Elaborate the Evaporator and Condenser by their characteristic's diagrams. Write the Logarithmic mean temperature difference (LMTD) equation which is independent of the direction of flow.