Self-evaluation Exercise (2006-2007)

(Please try to answer without referring to the notes. No need to submit your answer, but if you have problems with preparing the solution, please ask the lecturer for help.)

1. (a)   Briefly describe the six fundamental steps of direct digital control (DDC) system design. Illustrate with suitable diagrams or examples.

    (12 marks)

    (b)   DDC controller is the brain of a control system. Briefly explain the three main types of DDC controllers and their selection criteria.

    (6 marks)

    (c)   Identify the type of signals for the following control points in a DDC system by indicating DO (digital output), DI (digital input), AO (analogue output) and AI (analogue input).

    1)   Air flow modulation command

    2)   Differential pressure sensor

    3)   Differential pressure switch

    4)   Flow meter

    5)   Flow switch

    6)   ON/OFF command for a fan

    7)   ON/OFF status of a chilled water pump

    (7 marks)

2. (a)   What is OSI (open systems interconnection) seven-layer reference model? Briefly explain the purpose and services of each layer.

    (14 marks)

    (b)   Explain the meaning of "interoperability" for building automation and control systems. Suggest two methods to ensure this in the design of the systems.

    (5 marks)

    (c)   What do "BACnet" and "LON" stand for? With a suitable diagram or table, briefly explain how the layers of the OSI reference model are used in BACnet.

    (6 marks)