



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Dr. Walid A. M. Ghoneim

Course : Microprocessor Based Process Control

Course Code: EE 413

Time : 2 hours

Date : 2 / 6 / 2015

Marks: 40

Final Exam

Answer all the following questions

(Q1) (20 marks)

ILO (A4,5,8,12,15,27,31. B.1,2,3,7,19. C2,3)

1 – In a chemical reactor, the measured states are Level (L), Critical Level (LCR), Temperature (T) & Critical Temp. (TCR), Pressure (P) and Critical Pressure (PC).

The control outputs are heater (H), Pump (P) and Valve (V).

The Extreme Cases are:

- If at ANYTIME the Emergency Shut-Down Push button is pushed, then STOP the process (the heater and pump) immediately and START an Alarm Signal (Red Lamp and Siren).
- If the CRITICAL LEVEL is reached at 3.5 m, then stop the pump and open the valve immediately, and START an Alarm Signal (Yellow Lamp and Siren) till normal level reached at 3.2 m.
- If the CRITICAL PRESSURE is reached at 100 bars, Stop the pump, Stop the heater and Open the valve immediately, and START an Alarm Signal (Orange Lamp and siren) till normal pressure reached at 80 bars.
- If the CRITICAL TEMPERATURE is reached at 120 degrees, then stop the heater and wait for 120 seconds.
If the condition remains, then start the pump and open the valve till the temperature gets lower than 90 degrees.

i – Determine and define the type (Analog / Digital) and number of inputs and outputs. [2]

ii – Prioritize these extreme cases according to their importance with justifications. [2]

iii – How are you going to implement these extreme cases ? [2]

iv – State the flow-charts of these extreme cases. [4]

v – What will happen if Case (a) occurred while Case (c) is in progress? and why? Explain your answer with the aid of a sketch. [2]

vi – What type of microcontrollers will you use and why? [1]

vii – When will you have to use a microcomputer? [1]

Members of course Examination Committee:

Lecturer: Dr. Walid Ghoneim

Course Coordinator: Dr. Amr El-Shayeb

Head of Department: Prof. Hamdy Ashour

Signature:

Date:

30/5/2015

31/5/2015

31/5/2015

