Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	PROCESS MODELLING ANALYSIS AND SIMULATION
COURSE CODE	:	DAK 21303
PROGRAMME	:	2 DAK
EXAMINATION DATE	:	DECEMBER 2015/ JANUARY 2016
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	SECTION A) ANSWER **ALL** QUESTIONS
		SECTION B) ANSWER **TWO (2)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

SECTION A

Q1 (a) A programmable logic controller (PLC) is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, control of amusement rides, or control of lighting fixtures.

(i) Interpret ladder logic diagram of PLC as in **FIGURE Q1(a).**

(9 marks)

(ii) Describe an operation cycle of PLC.

(6 marks)

(b) Distributed Control System (DCS) refers to a control system in which the controller elements are not central in location.

(i) In your own words, briefly explain DCS.

(5 marks)

(ii) Write the functions of DCS.

(5 marks)

Q2 (a) (i) Define plant commissioning.

(2 marks)

(ii) Write the importance of plant pre-commissioning.

(4 marks)

(iii) Describe **four (4)** aims of plant pre-commissioning.

(4 marks)

(iv) List **five (5)** examples of process machinery and **five (5)** examples of instrument to be check and test during pre-commissioning of plant.

(5 marks

(b) Describe in details **five (5)** elements of plant inspection.

(10 marks)

SECTION B

Q3 Piping and Instrumentation Diagram (P & ID) is being used to show how equipment and piping is connected.

(a) Interpret **three (3)** major equipment with its controller in Piping and Instrumentation Design in **FIGURE Q3.**

(23 marks)

(b) Discuss function of system in **FIGURE Q3.**

(2 marks)

Q4 (a) Sketch Piping and Instrumentation Design (P & ID) for the following situation given.

(i) When fluid is added into tank A, temperature of medium will be altered. Temperature sensing element will detect this changes and send signal to temperature transmitter. Temperature transmitter will send electric signal to temperature indicator controller. Temperature indicator controller will send pneumatic pressure to control valve to open steam valve.

(6 marks)

(ii) On the same sketch diagram, there is a flow rate sensing element which measures the flow rate. Flow rate sensing element will send data to flow rate transmitter. Flow rate transmitter will send electric signal to flow rate indicator controller. Flow rate indicator controller will send pneumatic pressure to control valve to control opening of pipeline.

(6 marks)

(iii) A simple tank containing pH controller to maintain pH of medium at 6-8 (hint: 2 control systems for acid and base).

(13 marks)

Q5 Control valve regulates the flow rate of fluids through pipes in the process system by adjusting an opening through which the material flows.

(a) Under normal conditions, fluid passing through a valve will undergo a pressure drop across the valve orifice which is at its lowest pressure. Describe the meaning of flashing and cavitation condition.

(7 marks)

(b) Types of actuator are divided into 2 which are air-to-open and air-to-close. Compare these term.

(6 marks)

(c) Illustrate and differentiate **four (4)** types of valves.

(12 marks)

Q6 (a) (i) Describe basic operation of boiler.

(4 marks)

(ii) Sketch operation of boiler.

(1 marks)

(iii) Describe why a boiler need to undergo blow down.

(8 marks)

(iv) Compare intermittent blow down and continuous blow down of a boiler.

(6 marks)

(b) Sketch the right steam distribution system for the following.

(i) Drain point.

(3 marks)

(ii) Branch line.

(3 marks)

- END OF QUESTION –

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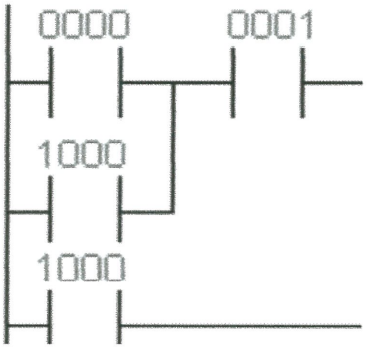
The Ladder Diagram



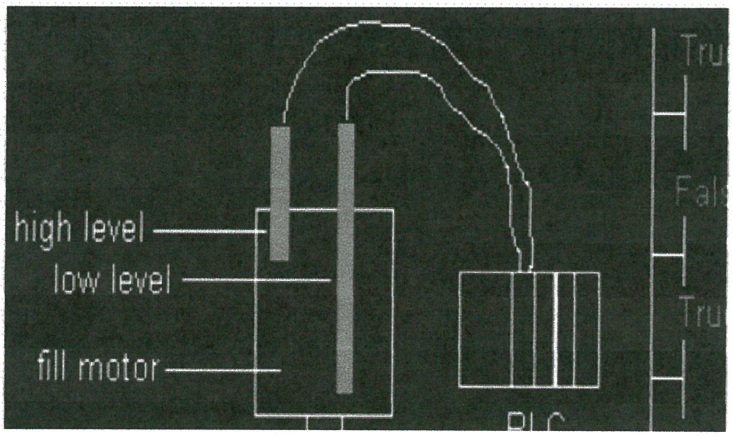


FIGURE Q1(a)

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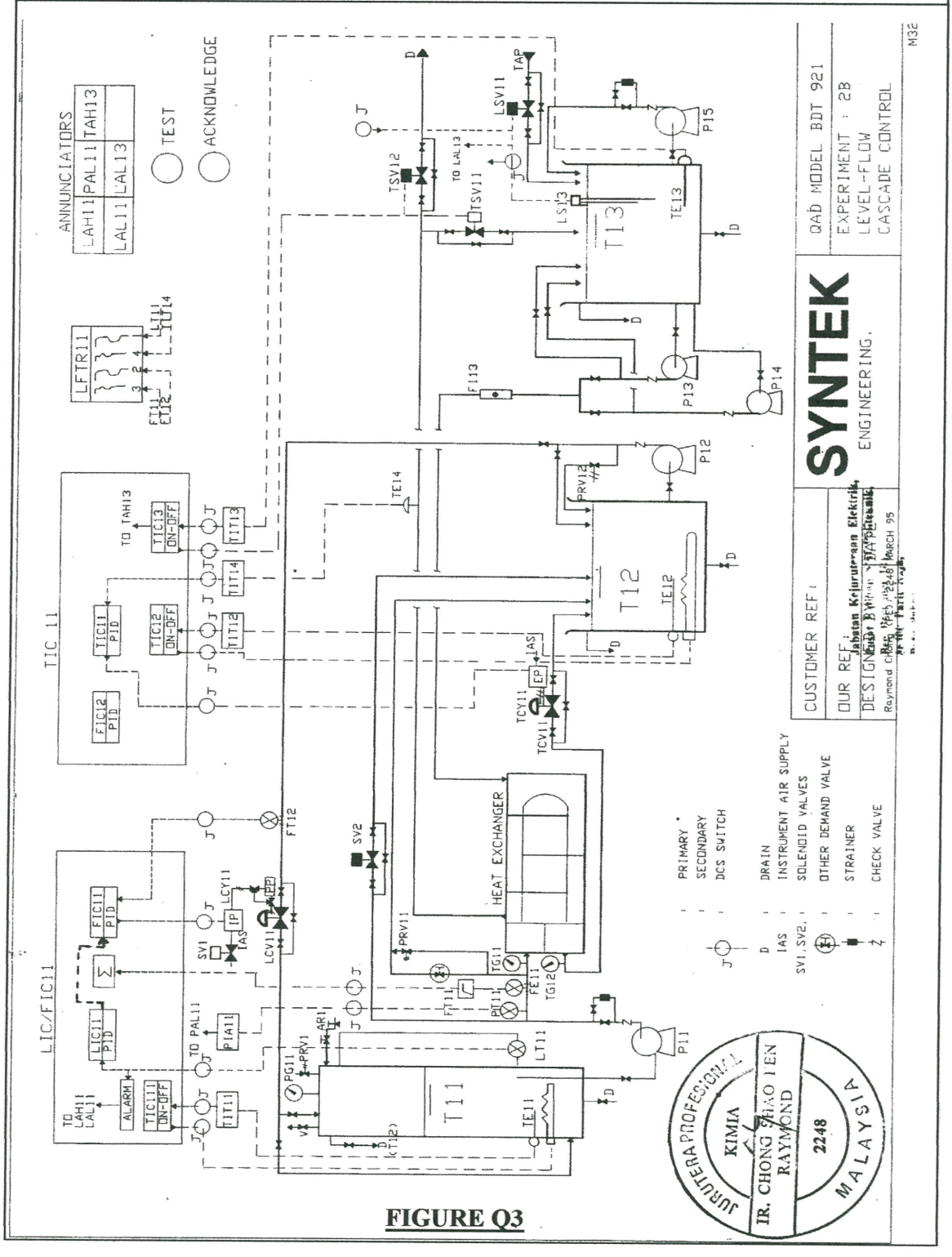

FIGURE Q3