Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019

COURSE NAME	:	INSTRUMENTATION AND CONTROL ENGINEERING
COURSE CODE	:	DAJ 31803
PROGRAMME CODE	:	DAJ
EXAMINATION DATE	:	DECEMBER 2018 / JANUARY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **FIVE (5)** QUESTIONS ONLY

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

QUESTION IN ENGLISH

Q1 (a) Discuss briefly on the process control. Demonstrate how manufacturers control the production process.

(10 marks)

(b) Prepare **three (3)** task requiring control loops in the process control industry work.

(5 marks)

(c) Differentiate the effects transducers and converters in primary elements.

(5 marks)

Q2 A hydraulic cylinder as shown in **Figure Q2** has bore of 90 mm and move a mass of 80 kg. It is controlled with a valve with a constant K_V = 20000 Pa/m. The damping coefficient is 180 Ns/m.

(a) Calculate the time constant, critical damping coefficient and the damping ratio.

(4 marks)

(b) Given that x_i and x_o are zero when t = 0, calculate the initial acceleration of the mass when the input is change suddenly to 5 mm.

(6 marks)

(c) Solve using the equation to evaluate the acceleration when the velocity reaches 2 mm/s.

(4 marks)

(d) Solve using the equation to evaluate the velocity when the acceleration is zero.

(6 marks)

Q3 (a) Explain briefly **three (3)** element in basic instrument system.

(5 marks)

(b) Describe the basic construction of a resistance type temperature sensor and state the reason why it is unaffected by the temperature of the gauge head.

(5 marks)

(c) Show with diagram the basic pressure gauge using bourdon tube.

(10 marks)

Q4 (a) Identify out the benefits of automated control on the purchase cost, running cost and quality of mass production vehicles in latest 5 year.

(10 marks)

(b) Draw the control circuit block diagram for the steam pressure regulation system described in **Figure Q4(b)**.

(10 marks)

Q5 (a) Sketch and explain global valve and the function of directional for single seat two port valve and double seat two port valve.

(10 marks)

(b) Sketch and explain actuator and the **two (2)** main forms for pneumatic actuators.

(10 marks)

Q6 (a) Illustrate and explain microprocessor-based and what are the functions and features of a typical distributed control system (DCS).

(10 marks)

(b) Explain the operation and purpose of the processor in a typical programmable controller system.

(5 marks)

(c) Show the block diagram of a typical PLC system in detail.

(5 marks)

Q7 (a) Show the operation and purpose of each level in block diagram of plant-wide control and data collection system.

(10 marks)

(b) Demonstrate how the communication and data transfer in safety system logic and control take place.

(10 marks)

- END OF QUESTION –

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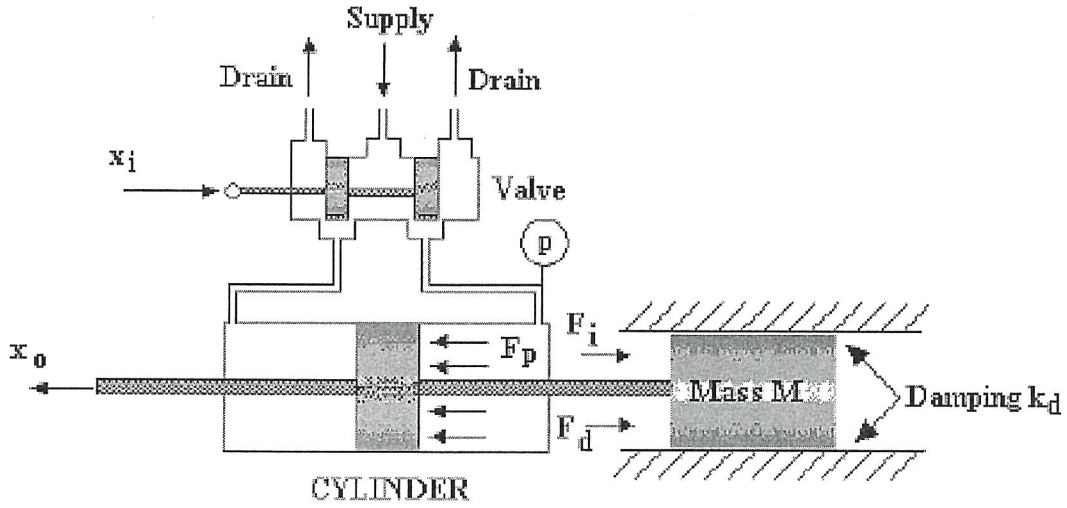

Figure Q2

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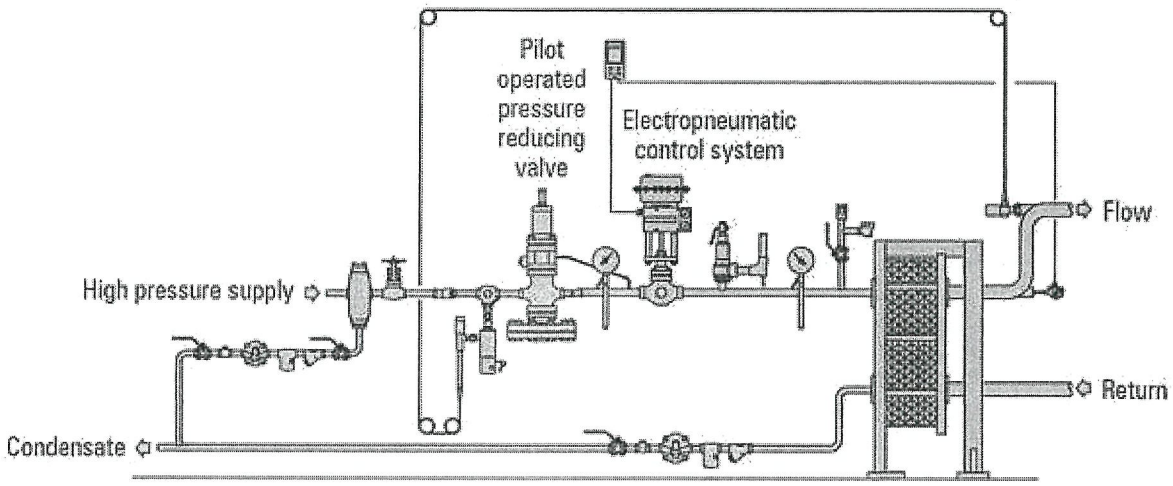

Figure Q4(b)