



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : INSTRUMENTATION
- COURSE CODE : BDG 10503
- PROGRAMME CODE : BDG
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

PART A

Q1 There are **FIVE (5)** questions. Please answer all of question.

(a) Instrumentation is vital in many oils and gas industry. It used to measure, indicate and record of process variable in control method. Determine **FOUR (4)** objectives of Instrumentation in process plant.

(4 marks)

(b) Number system is a way to represent numbers in computer architecture. There is various type of numbers system used to express real number in computer. Choose common type of numbers system used in computer and demonstrate the example of number format.

(8 marks)

(c) A single binary digit is called a bit. Classify the binary number type below into binary bit name in **Table Q 1(c)**.

Table Q1.1 Binary Number

Binary Numbers	Binary bit name
101	
10101	
100001	

(5 marks)

(d) Conversion of number system is importance in computer architecture. Solve the 124 Decimal number into binary number.

(4 marks)

(e) Process variable is any variable in property show a physical or chemical of a process. There are many types of variables used in process. Outline the basic process variable in oil and gas process.

(4 marks)

Q2 There are **FIVE (5)** question. Please answer all questions.

(a) There are many methods of measurement type for process variable in plant. List out **FOUR (4)** method of common measurement type.

(4 marks)

- (b) Conversion binary number to decimal number used to confirm the process of number conversion. Solve the 0.00111 binary number into decimal number.
(4 marks)
- (c) Resistance decade box is a common test equipment in oil and gas industry. It also known as resistance substitution box and used for calibration device. Identify the application of Resistance decade box in plant process.
(5 marks)
- (d) Logic gates are building block used to create digital circuit in digital electronic device. Differentiate the AND gate and OR gate in terms of:
(i) Boolean expression
(ii) Logic diagram symbol
(iii) Truth table
(7 marks)
- (e) Null balance is one of the methods of measurement in instrumentation. The concept of measurement is made by varying the amount of known quantity being compared to unknown quantity until equilibrium established. Sketch the null balance of glass tube manometer.
(5 marks)

Q3 There are **FIVE (5)** question. Please answer all questions.

- (a) The measurement properties of an instrument determine the quality of the instrumentation. Identify **FOUR (4)** quality of measurement characteristic in instrumentation.
(4 marks)
- (b) The resistance temperature detection (RTD) used a determine variable to change the electrical characteristic of a measurement element. Sketch the simple circuit of RTD in oil and gas plant for the heating process of a tank.
(4 marks)
- (c) The electrical and pneumatic are used for the instrument signal. Table at **Appendix A.1** show the instrument standard signal. State the electrical signal (volt), pneumatic signal, and instrumentation indication.
(6 marks)

- (d) Control system is a group of components which maintain the desire result by manipulating the value of another variable in the system. Compare the nonfeed back system with feedback system in term of block diagram sketching.
(6 marks)
- (e) Terminology of basic control discuss about controlled variable, manipulated variable and control. There are others terminology in control that also discuss for better understanding of control system. Examine the others terminology.
(5 marks)

Q4 There are **FOUR (4)** question. Please answer all questions.

- (a) Process control principle is to regulate the value of some quantity with desire value or called reference value. Classify the type of control in industry with example.
(6 marks)
- (b) The ballons or bubble symbols represent the instrumentation and control device. The size of ballons in drawing must 10mm diameter. Recall **FIVE (5)** basic ballons symbol in instrumentation drawing.
(5 marks)
- (c) Instrument identification system generally include tag number to define process function, loop number and plant number. Interpret the first letter and succeeding letter of Flow, Temperature, level, Pressure, Hand and Speed.
(6 marks)
- (d) Process equipment symbols represent a special or unique symbol given to a process equipment such as vessel, heater, pump, mixers and others. Sketch the inhibitor injection tank with mixer and centrifugal pump.
(8 marks)

- END OF QUESTIONS -

Electrical signal (DC)	Electrical signal (DC)	Instrumentation Indication	Pneumatic signal
(mA)	Volt	%	psi
4			
8			
12			
16			
20			

Table APPENDIX A.1

APPENDIX A