UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	JQD 20603
COURSE TITLE	:	METROLOGY 2
PROGRAMME LEVEL	:	DIPLOMA
DATE	:	29 MAY 2016
TIME	:	2.30 PM – 5.30 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of TWO (2) sections.
4. Answer ALL questions in Section A. Choose TWO (2) questions in section B.
5. Please write your answers on the answer booklet provided.
6. Please answer all questions in English only.

THERE ARE 4 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions
Please use the answer booklet provided

Question 1

Surface topography is of great importance in specifying the function of a surface. A significant proportion of component failure starts at the surface due to either an isolated manufacturing discontinuity or gradual deterioration of the surface quality. In the manufacturing industry, surface must be within certain limits of roughness.

(a) Based on the Layman's Guide to the surface texture measurement, explain the principle of surface roughness measurement in order to separate the roughness, waviness and form during the inspection.

(6 marks)

(b) Analyze the consequences if the operator does **NOT** consider the appropriate cut-off value in measuring the surface roughness. Justify your answer.

(4 marks)

(c) Give **FIVE (5)** applications of roughness testing in real industry

(5 marks)

Question 2

(a) Describe the factors that can cause steady-state measurement error in temperature device.

(5 marks)

(b) Discuss the following temperature measuring instrument:

i. Thermocouple (5 marks)
ii. Resistance Temperature Detector (RTD) (5 marks)

Question 3

(a) Differentiates between measurement process and not measurement process

(6 marks)

(b) Explain the reason of calculating the standard deviation in uncertainty analysis

(4 marks)

(c) Figure1 show the system Bellow in manometer. Explain the principle operation in Bellow system.

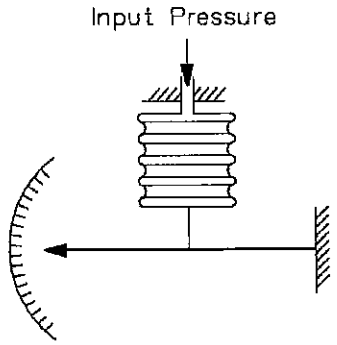

Figure 1: Bellow System.

(5 marks)

Question 4

(a) Based on your understanding, explain the concept of absolute pressure and gauge pressure in pressure measurement.

(8 marks)

(b) Identify **SEVEN (7)** parameters that should be concern when selecting a pressure gauge.

(7 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Choose TWO (2) questions only
Please use the answer booklet provided

Question 1

(a) Most of engineers believe that it is sufficient to measure the diameter of a work piece in several places, with the difference in readings assumed to represent out-of-roundness of the component. Based on concept of roundness measurement, determine the reasons contribute to out-of-roundness case.

(4 marks)

(b) There are several techniques in measuring roundness. The most common techniques are rotational datum using a stylus and component rotation method. By using a detail diagram, classify the concept of this both checking methods

(6 marks)

(c) By referring to Question 1 (b), justify the most accurate method of rotational rotating checking method.

(6 marks)

(d) Controlling the process tool has become the obvious method of manufacturing in the 21st century. As a product engineer, determine the reasons why manufacturers are measure the roundness of components/parts.

(4 marks)

Question 2

Surface regularities can be quantified in term of surface roughness value as it as concerned with the size and shape of surface. In any manufacturing process, they cannot obtain any absolutely smooth and flat surface because the machinability for the workpiece are also has an effect on surface finish condition.

(a) Evaluate the factors affecting the surface finish in machining process caused by machining variable and tool geometry

(6 marks)

(b) Discuss the precaution for surface roughness measurement

(8 marks)

(c) Determine the important of surface roughness technology in industry.

(6 marks)

Question 3

(a) Coordinate measuring machines (CMM) are relatively recent developments in measurement technology. Based on your understanding, discuss the concept operation of CMM.

(6 marks)

(b) Identify the purpose of CMM.

(4 marks)

(c) Reverse engineering is a process by which the design of a product is analyzed or re-created using a physical part or mock-up as a starting point. This becomes truly valuable when trying to extract the design intent from a handmade model (like a supercar), from discontinued parts or from an old design that was made without a 3D model reference (rare models, prototypes). You as an engineer, propose a good metrology instrument in making a reverse engineering analysis for car body design project. Justify your answer.

(10 marks)

END OF EXAMINATION PAPER