



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2011 SESSION

SUBJECT CODE : FGD 30103
SUBJECT TITLE : INSTRUMENT CALIBRATION
LEVEL : DIPLOMA
TIME / DURATION : 12.30 pm – 2.30 pm
(2 HOURS)
DATE : 04 MAY 2011

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. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.
 6. Answer all questions in English.
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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

- a) Describe the hardness of measuring faces for spindle and anvil of a micrometer.
(6 marks)
- b) Write the principles of micrometer adjustment.
(6 marks)
- c) Explain the function of index line and ratchet drive of a micrometer.
(8 marks)

Question 2

- a) Analyze the temperature and humidity requires for dimensional metrology lab.
(4 marks)
- b) Give your comments on reliability of measuring instrument.
(6 marks)
- c) Explain the coefficient of thermal expansion (CTE) of steel use to make measuring instruments.
(10 marks)

Question 3

- a) Sketch the free position of dial gauge pointer at rest.

(6 marks)

- b) Describe the term discrimination or sensitivity in calibration of dial gauges.

(6 marks)

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- c) Explain the roles of the plunger and the stem of dial gauges.

(8 marks)

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SECTION B (Total: 40 marks)**INSTRUCTION: Answer TWO (2) questions only.****Please use the answer booklet provided.****Question 1**

- a) Referring to table below, draw the calibration curve for periodic error.

Divisions of dial	0	10	20	30	40	50	60	70	80	90
Turn I	0	-1	+1	-	-	-	+6	+4	+2	-
Turn II	-	-	0	+2	+4	-	-	-	+3	+2
Turn III	0	-	-	-	+4	+6	+8	-	-	-
Turn IV	+1	-1	0	-	-	-	+7	+5	+3	-
Turn V	-	-	0	+2	+4	-	-	-	+5	+3

Table 1: Error of reading of dial gauge given on units of 0.0001 in.

(14 marks)

- b) Write a procedure to perform repeatability of reading for dial gauges as stipulated in B.S 907: 1965?

(6 marks)

Question 2

- a) Describe the calibration procedure for profile projector which has X and Y micro-stage movement. (14 marks)
- b) The measured length of a standard scale is 50.8 mm, the actual length of standard scale is 50.0 mm, and the magnification lens is 10 times. From the given formula calculate the magnification error.

Formula:
$$\Delta M = \frac{L - I M}{I M} \times 100 \%$$

$$\Delta M = \frac{L - I M}{I M} \times 100 \%$$

ΔM : magnification error

L : measured length of the standard scale

I : length of the standard scale

M : magnification of the projection lens

(6.marks)

Question 3

- a) Write calibration procedure for precision Vernier caliper in accordance with the B.S 887:1982 (12 marks)
- b) Describe the types of material used to construct slider and beam of a Vernier caliper. (8 marks)

END OF QUESTION