



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2013 SESSION**

SUBJECT CODE : FGB 20102
SUBJECT TITLE : ENGINEERING METROLOGY
LEVEL : BACHELOR
TIME / DURATION : 2 HOURS
DATE :

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 paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions only.
 6. Answer all questions in English.
-

THERE ARE 3 PAGES OF QUESTIONS AND 4 PAGES OF APPENDIX, EXCLUDING THIS PAGE.

INSTRUCTION: Answer any FOUR (4) questions.

Please use the answer booklet provided.

Question 1

- (a) Explain the meaning of accuracy and precision in engineering metrology?
(4 marks)
- (b) What are the importance of accuracy and precision of collected data in working environment such as follows:
- (i) Quality Control Inspection
 - (ii) Sensitivity
 - (iii) Range of measurement
- (6 marks)
- (c) A hole and mating shaft are to have a nominal assembly size of 25 mm. The assembly is to have a maximum clearance of 0.25 mm and a minimum clearance of 0.15 mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the limits for both hole and shaft by using:
- (i) Hole basis system
 - (ii) Shaft basis system
- (15 marks)

Question 2

- (a) Explain the concept of limit gauging, taking the example of gauging of holes and shaft. Also list out the advantages and disadvantages of using limit gauges.
(6 marks)
- (b) Discuss about the tolerance and wear allowance in limit gauges.
(4 marks)
- (c) Design general type GO and NO GO gauges for components having **80H9-d10** fit without allowing any gauge tolerance. You also need to sketch the gauges with the values.
(15 marks)

Question 3

- (a) State two (2) types of errors in measuring process
(4 marks)
- (b) Describe the relative advantages of Micrometer and Vernier Caliper.
(6 marks)
- (c) Explain the principle of operation of optical flats. How flatness is tested with optical flats?
(6 marks)
- (d) Explain briefly the Geometrical Test for the following characteristics done in the laboratories.
- (i) Flatness
 - (ii) Circularity
 - (iii) Cylindricity
- (9 marks)

Question 4

- (a) Define the terms primary texture and secondary texture.
(5 marks)
- (b) Explain the factors affecting surface roughness? What is the necessity for controlling the surface texture ?
(10 marks)
- (c) Describe evaluation of surface finish by:
- (i) Peak to valley height method
 - (ii) The average roughness method
- (10 marks)

Question 5

(a) Explain the meaning of:

- (i) Nominal size
- (ii) Maximum clearance
- (iii) Minimum clearance
- (iv) Tolerance

Draw a neat sketch to represent these terms for a shaft and hole of clearance fit.

(10 marks)

(b) As a design engineer, you have to provide specifications of a heavy shaft , **90J7-j6** to the production manager. By referring to the standard given, determine:

- (i) Tolerance for the shaft and hole
- (ii) Type of fit according to the given shaft and hole
- (iii) Sketch the limit of tolerance and allowance for the given shaft and hole

(15 marks)

END OF QUESTION