

Menoufia University
Faculty of Engineering
Prod. Engg.&Mech. Design Dept.
6/6/2015

Postgraduate
Level PRE509
Metrology
Time 3 hrs.

This Exam measures ILOS no. (a1-1,112-1,b8-1,b13-c1-1,c9-1,d1-1).

Allowed Table and Charts (None).

FIRST PART { (50 marks)}

Question (1):

- How will you measure the plug gauge using an optical flat.
- What is the type of optical flat. Explain how to check the flatness and parallelism of optical flats .

Question (2):

- Describe an arrangement and show the calculate the angle of hole drilled an angle to a flat surfaces and drive the expressions.
- How will you measure the angular spacing of a spline shaft having splines with parallel faces.

Question (3):

- Explain how to check the bore of over arm support bracked co-axial with spindle of horizontal milling machine.
- Explain how to check the parallelism of the axis centers to the bed center lath.

SECOND PART (50 marks)

Question (1): (20 marks)

- **Defined ISO 9000 and explain the principles of ISO 9000.**
- **How meaning ISO 9000.**
- **What are requirements of ISO 9000.**
- **Explain the steps of ISO 9000.**

Question (2): (30 marks)

- **Explain the Co-ordinate Measuring Machine control methodologies.**
- **What are the major steps in inspection.**
- **Draw and explain a scanning laser device.**
- **Describe the Non-contact non-optical inspection techniques.**
- **Where the characteristics of measuring instruments are is used.**
- **What are the types of spindle error.**