Menoufia University
Faculty of Engineering
Prod. Eng. & Mech.
Design Dept.   10/1 / 2018

Diploma [LEVEL 500]
Metrology (1)
Three Hrs.
PRE 509

This Exam measures ILOS no. (a1 -1,a-2-1),b1-1,b4-1,b5-1-c1-1,c2-1,d2-1).
Allowed Table and Charts (None). [Answer all the following questions]

Question (1) [20 mark]

a- List the procedure of better measurements?

b- Explain the guiding principles when using SI units?

c- Drive a worked example for caliper Uncertainty.

d-Which factors affecting and checking caliper performance.

e-What are the precautions when storing calipers? And what are the sources of measurement uncertainties and error.

Question (2)[20 mark]

a- Define and explain the following; Calibration Tolerance, Accuracy, Traceability and Uncertainty

b- Instrument error can occur due to a variety of factors, explain.

c- Inspect the zero and span errors and how to detect and correct instrument errors.

d- Discuss the Error sources when using depth micrometers.

e- Explain briefly the Dial Indicators Calibration Procedure.

Question (3)[20 mark]

a-Indicate some of general criteria which can be satisfied in the monitoring methods during using of instruments.

b-Discuss metrological redundancies method which can be used for monitoring the instruments during used.

c- Analyze the second method "checking the coherence of the results" used for monitoring the instruments and state the measurement process concepts.

d- What is meant by the calibration intervals?

e- List the sources of calibration?

Question (4)[20 mark]

a- Explain the factors influencing the recalibration. Also, explain the reason of calibration Periodicity.

b- Analyze the traceability of the standard recalibration.

c-Identify the rules of cost when evaluating the Calibration Intervals. Also, analyze the results when using the monitoring methods.

d- Define and explain the following: Deviation span, measuring deviation, Repeatability, Standard and Standard deviation.

e- Discuss and explain, In-house calibration" term.   <u>See Page (2)</u>

Question (5)[20 mark]

a- Identify the main tests performed on mechanical pressure measuring instrument?

b- Discuss the reference standards term, and apply it for the calibration of pressure measuring instruments.

c- What are the main sources of errors? And discuss the three methods which are used in calculation of errors.

d- Errors are expressed in two forms, absolute error and relative error. Discuss the statement.

e- Write short notes about systematic (or Bias) errors and random errors.

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This Exam Measure The following ILOs												
Question Number	Q1-a,b	Q3-b,d	Q4-b, d	Q5-d	Q6-a,d	Q2-b,c,d	Q1-c,d	Q2-a	Q3-a, c	Q4-a,c	Q5-a,b,c	Q6-b, c
Skills	a1-1	a2-1	a1-1	a2-1	a1-1	b4-1	b1-1	b4-1	C1-1	c2-1	d2-1	b4-1
	Knowledge &Understanding						Intellectual and Professional skills					

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Question No.	Q1	Q2	Q3	Q4	Q5
MARKS	20	20	20	20	20

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