

C19 2718

Menoufia University
Faculty of Engineering
Prod. Eng. & Mech.
Design Dept.

Second Year
Prod. Metrology
Three Hrs.
15 / 6 / 2014

This Exam measures ILOS No.:(a1-1,a12-1,a12-2,a19-1,b8-1, b17-1, c1-1,c9-1,c14-1).
Answer all the following questions: (Marks of exam=100).

Question (1)

(10 Marks)

a) Define the following:

actual size – span - Scale interval and Repeatability.

b) Differentiate between accuracy and Uncertainty with example.

c) What are the important elements of measurements?

d) What are the fields of sciences that are required for metrology.

Question (2)

(20 Marks)

a) What are the various types of linear measuring instruments (Draw and explain one type).

b) Draw and explain one type of Height Gauges.

c) Draw the following reading:

15 .1mm, 16.01mm, 17.04mm and 18.58mm.

d) Draw front view of one from the following Micrometres:

-V- anvil Micrometre, Digital inside Micrometre and Micrometre Bore.

Question (3)

(20 Marks)

a) Write about the causes of workpiece variation.

b) Define the following : Allowance - Geometric Tolerance.

c) Calculate the different tolerances of the following dimensions: 45 H8/g6 and 45 H9/d9.(using tolerance tables).

d) Describe and draw the relations when assembled two mating parts.

See Pages (2 and 3)

Question (4)

(20 Marks)

- a) What are the advantages and disadvantages of pneumatic comparator?
- b) Classify the comparator according to the principles used for obtaining magnification. And Draw one only.
- c) What are the major types of an electrical comparator? Draw one type.
- d) State any three advantages and disadvantages of reed type mechanical comparator.

Question (5)

(20 Marks)

- a) Why the limit gauges and Which materials are used for manufacturing .
- b) What are the advantages and benefits of using fixed limit gauges.
- c) Which operation the following gauges are used?
 - i) Plain gauges , ii) Standard gauges , iii) Limit gauges ,
 - iv) Workshop Gauges , v) Inspection Gauges, vi) Purchase Inspection Gauges and vii) Reference or master gauges.
- d) Classify the gauges According to the form of the tested surface.

Question (6)

(10 Marks)

- a) Define the following: (i) Error and correction. (ii) Systematic errors.
- b) What do you understand by the term of cosine error, give example .
- c) What are the Classifications of Slip gauges.
- d) Describe the sequence of slip gauges manufacturing.

(Exam Marks) :

Question No.	1	2	3	4	5	6
Marks	10	20	20	20	20	10

(c) 8.5-15

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
	a1-1	a12-1	a12-2	a19-1	a19-1	a12-2	b8-1	b17-1	c14-1	c1-1	c9-1
Skills	Knowledge & Understanding						Intellectual and Professional skills				

Tolerances of holes						Tolerances of shafts				
Nominal sizes	H7	H8	H9	H10	H11	d9	p6	f7	g6	h6
From 1	+10	+14	+25	-40	+60	-20	-14	-6	-2	0
Upto 3	0	0	0	0	0	-45	-28	-16	-8	-6
Over 3	+12	+18	+30	+45	+75	-30	-20	-10	-4	0
Upto 6	0	0	0	0	0	-60	-38	-22	-12	-8
Over 6	+15	+22	+36	+58	+90	-40	-25	-13	-5	0
Upto 10	0	0	0	0	0	-75	-47	-28	-14	-9
Over 10	+18	+27	+43	+70	+110	-50	-32	-16	-6	0
Upto 18	0	0	0	0	0	-93	-59	-34	-17	-11
Over 18	+21	+33	+52	+84	+130	-65	-40	-20	-7	0
Upto 30	0	0	0	0	0	-117	-73	-41	-20	-13
Over 30	+25	+39	+62	+100	+160	-80	-50	-25	-9	0
Upto 50	0	0	0	0	0	-142	-89	-50	-25	-16
Over 50	+30	+46	+76	+120	+190	-100	-60	-30	-10	0
Upto 80	0	0	0	0	0	-174	-105	-60	-29	-19

Tolerances Table