IE-352
Section 1, CRN: 48700/1/2
Section 2, CRN: 48703/4/5
Section 3, CRN: 48706/7/8
Second Semester 1434-35 H (Spring-2014) – 4(4,1,2)
"MANUFACTURING PROCESSES – 2"

Tuesday, March 11, 2014 (12/05/1435H)

MIDTERM 1 ANSWERS

Name:	Student Number:	Section:
AHMED M. EL-SHERBEENY, PHD	4	S/M8/M10

Place the correct letter in the box at the right of each question [$\frac{1}{2}$ Point Each]

1. **Nickel is an example of a(an) …** **E**

   A. ferrous metal

   B. metal-polymer composite

   C. crystalline ceramic

   D. elastomer

   E. non-ferrous metal (*slide 1.23*)

2. **The three building blocks of modern manufacturing are …** **A**

   A. materials, processes, and systems (*slide 1.16*)

   B. technology, production, and systems

   C. materials, processes, and industry

   D. technology, production, and industry

   E. materials, production, and industry

3. **Sintering is an example of a … process, and involves …** **A**

   A. property-enhancing; pressing powder particles (***also accepted***)

   B. solidification; heating material under its melting point

   C. property-enhancing; heating material under its melting point (*slide 1. 36,40*)

   D. deformation; heating material beyond its melting point

   E. solidification; pressing powder particles

B

4. **Permanent joining processes DO NOT include …**

   A. brazing

   B. press-fitting (*slide 1. 32,42*)

   C. soldering

   D. welding

   E. adhesive bonding

E

5. **The figure below displays -most likely- what type of production?**

   A. flow line production

   B. batch production

   C. job shop

   D. quantity production

   E. cellular manufacturing (*slides 1. 49,56*)

D

6. **What must always be connected to both manufacturing systems AND processes?**

   A. manufacturing engineering

   B. engineering materials

   C. all manufacturing support systems

   D. quality control system (*slides 1. 53, 54*)

   E. production planning and control

A

7. **The device shown below is an example of a(n) …**

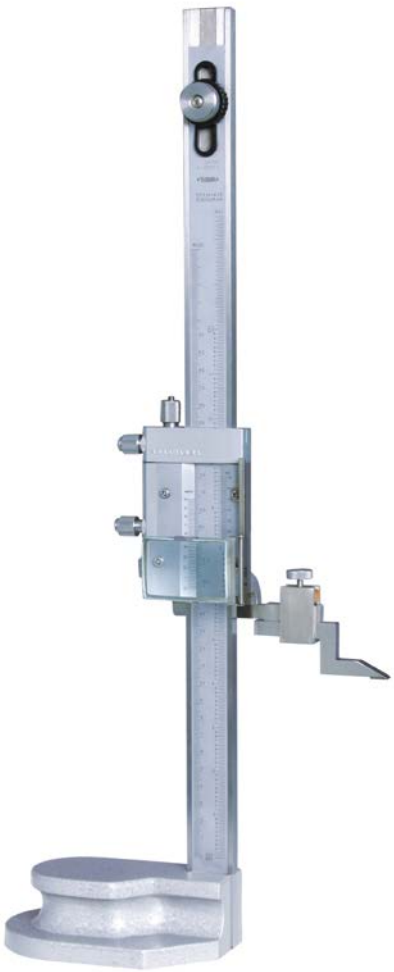
   A. Vernier height caliper (*slide 2.26*)

   B. Vernier depth caliper

   C. micrometer depth gage

   D. Vernier micrometer height caliper

   E. micrometer height gage



8. **Figure below shows a… gage, where … and … denote *go* and *no* gages, respectively** **D**

A. plug; *R*; *Q*

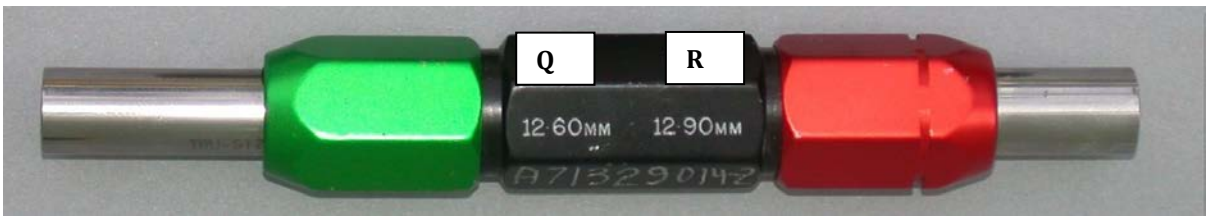
B. snap; *Q*; *R*

C. ring; *Q*; *R*

D. plug; *Q*; *R* (*slides 2. 39*)

E. snap; *R*; *Q*

Note how you can identify the *no-go* gage by,
- Measurement (larger size, 12.90 mm)
- Color (red)
- Shorter end of plug
- Groove cut



9. **The correct reading in the … shown below is …** **B**

A. Micrometer scale; 0.399 mm

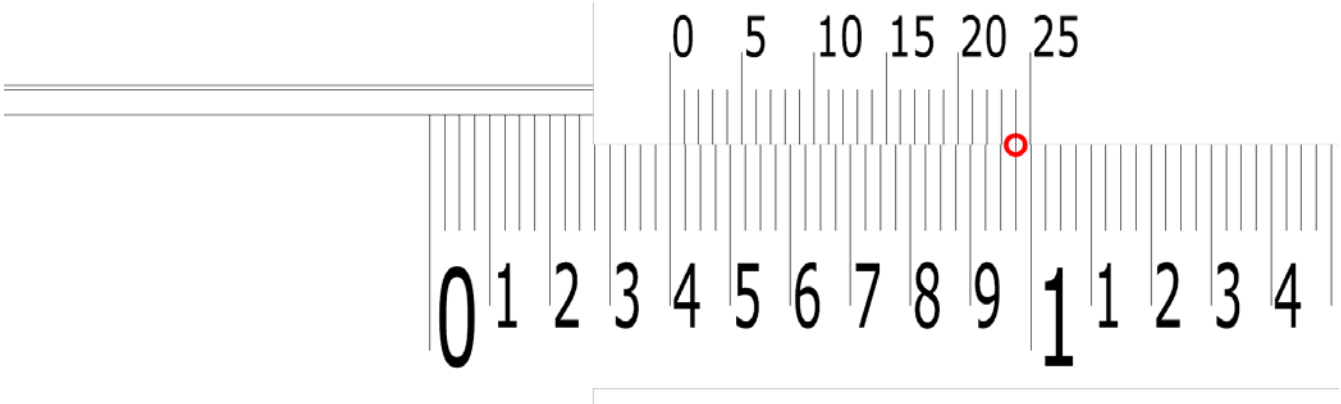
B. Vernier scale; 0.399 *in*

C. Micrometer; 3.99 in

D. Vernier scale; 0.424 in

E. Vernier scale; 4.24 mm

$= 0 * 1\ in$
$+ 3 * 0.1\ in = 0.3$
$+ 3 * 0.025\ in = 0.075$
$+ 24 * 0.001\ in = 0.024$
$= \mathbf{0.399\ in}$



C

10. **The correct reading in the … shown below is …**

A. Micrometer scale; $34.74\ in$

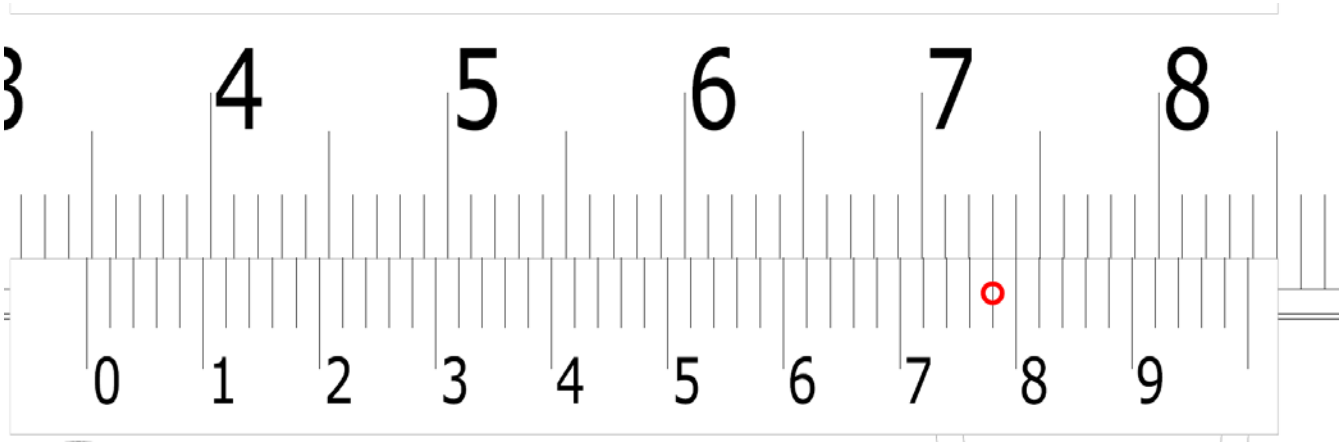
B. Vernier scale; $34.73\ mm$

C. Vernier scale; $34.78\ mm$

D. Vernier scale; $3.478\ in$

E. Micrometer; $45.78\ mm$

$= 3 * 10\ mm = 30\ mm$
$+ 4 * 1\ mm = 4\ mm$
$+ 78 * 0.01\ mm = 0.78\ mm$
$= \mathbf{34.78\ mm}$



E

11. **The correct reading in the … shown below is …**

A. Vernier caliper; 1.356 in

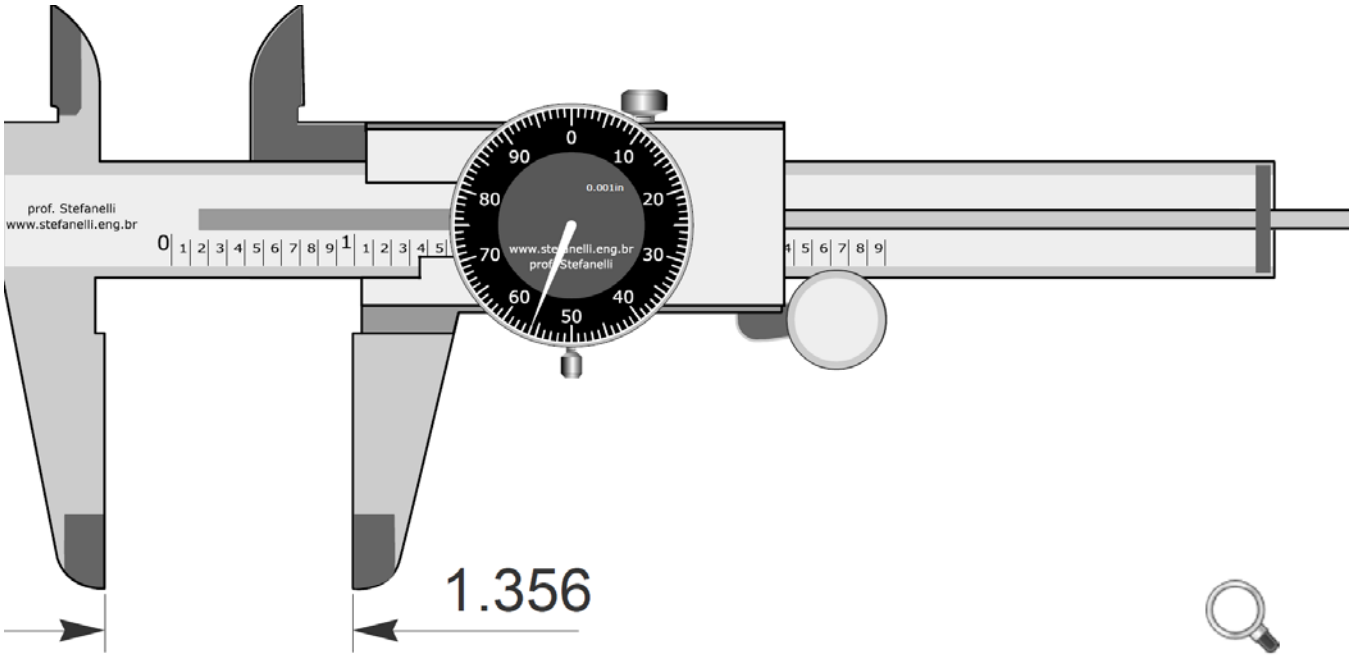
B. dial caliper; 1.56 in

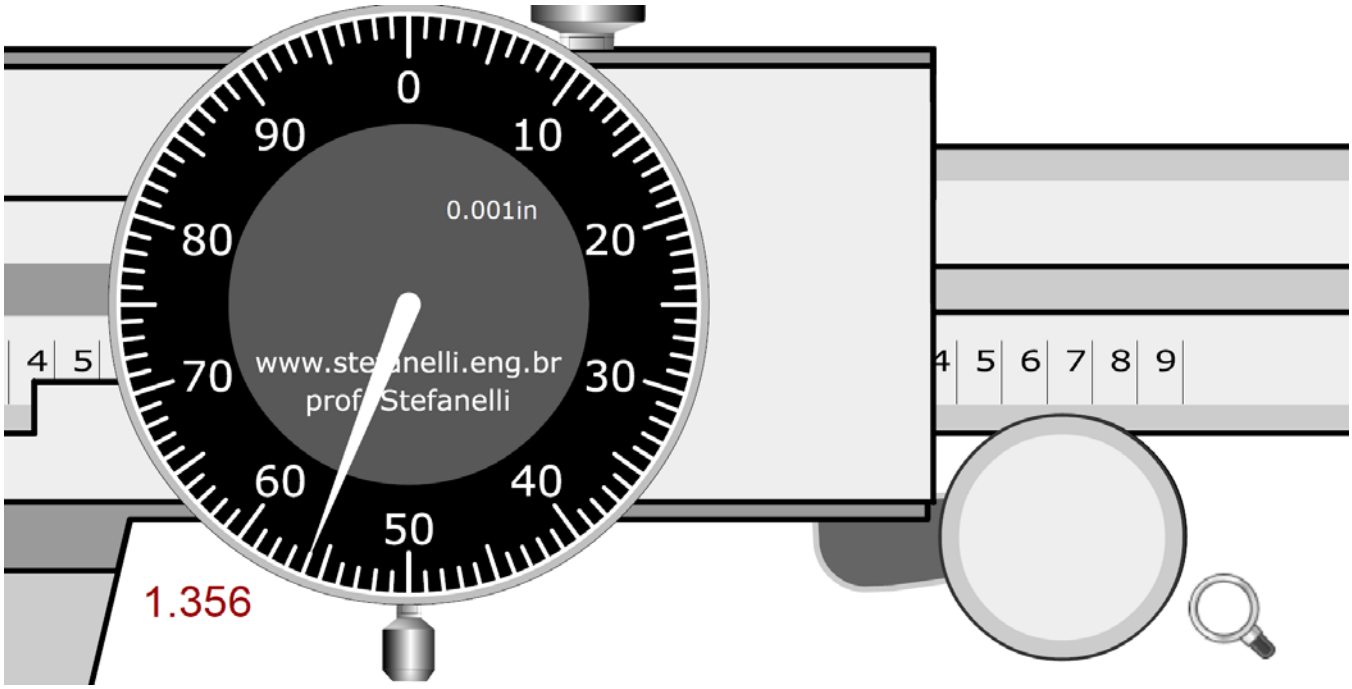
C. Vernier caliper; 13.56 mm

D. dial caliper; 13.560 in

E. dial caliper; 1.356 in

$= 1 * 1\ in = 1\ in$
$+ 3 * 0.1\ in = 0.3\ in$
$+ 56 * 0.001\ in = 0.056\ in$
$= \mathbf{1.356\ in}$





B

12. **The correct reading in the … shown below is …**

A. inside micrometer; 9.87 mm

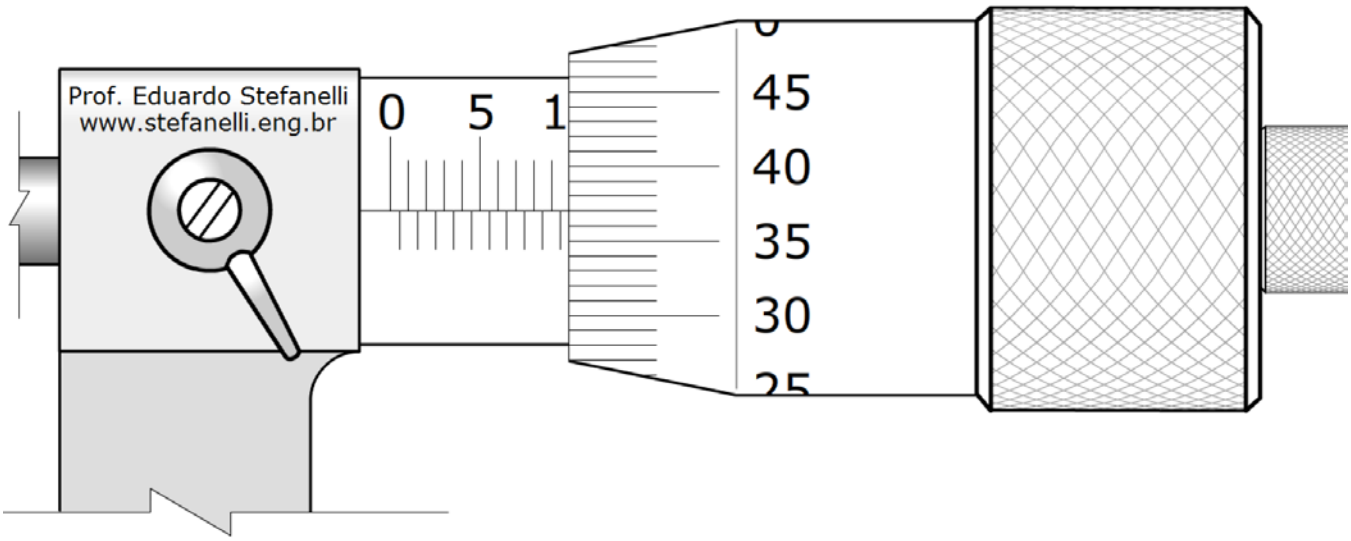
B. outside micrometer; 9.87 mm

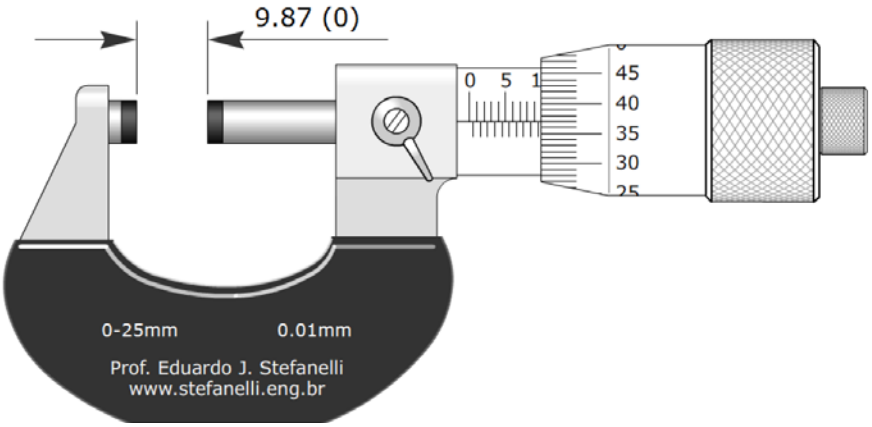
C. inside micrometer; 10.43 mm

D. outside micrometer; 10.87 mm

E. outside micrometer; 10.537 mm

$= 9 * 1\ mm = 9\ mm$
$+ 1 * 0.5\ mm = 0.5\ mm$
$+ 37 * 0.01\ mm = 0.37\ mm$
$= \mathbf{9.87\ mm}$





C

13. **The correct reading in the … shown below is …**

A. depth Vernier; 9.99 mm

B. depth Vernier; 10.01 mm

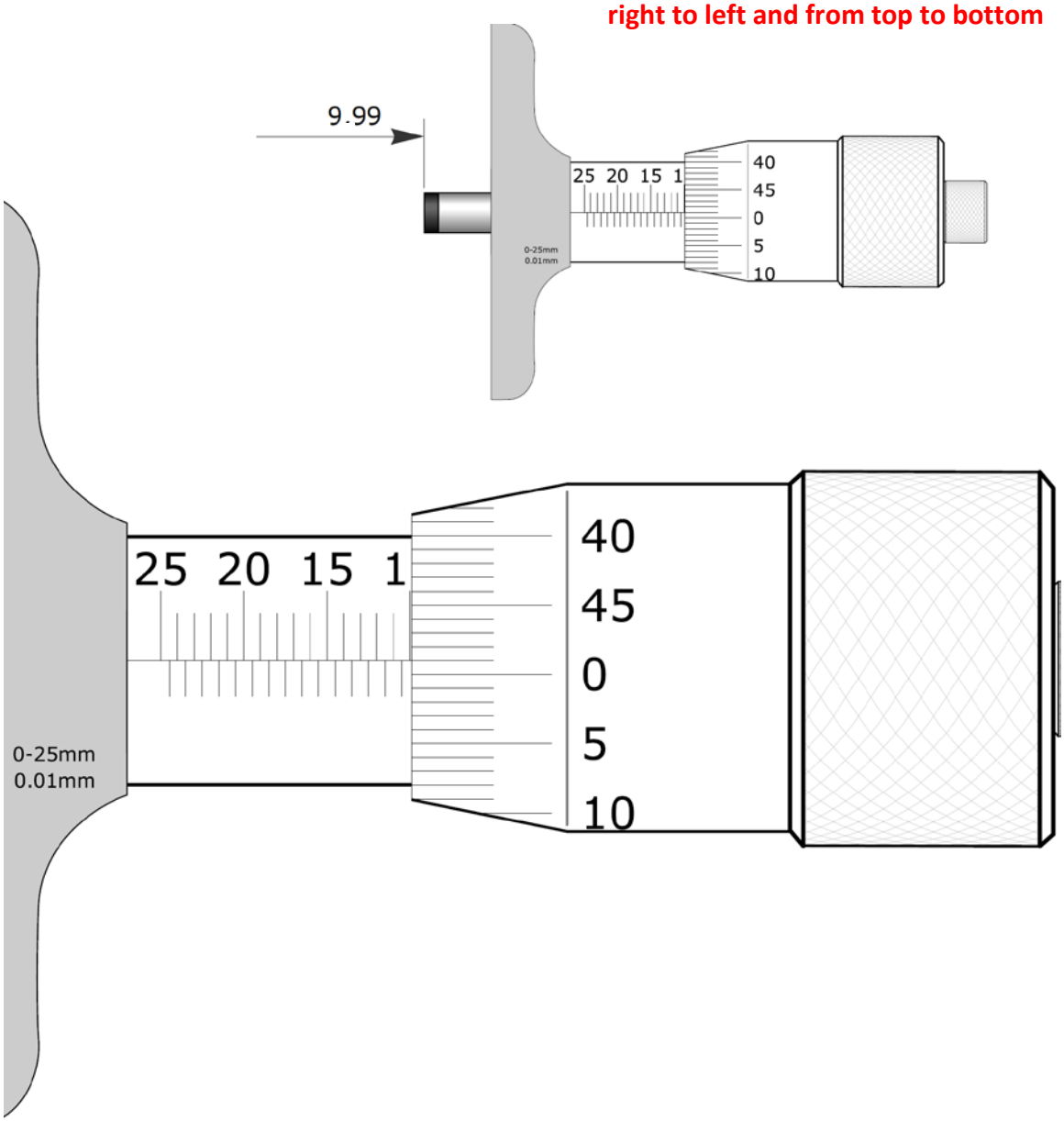
C. depth micrometer; 9.99 mm

D. depth Vernier; 10.49 mm

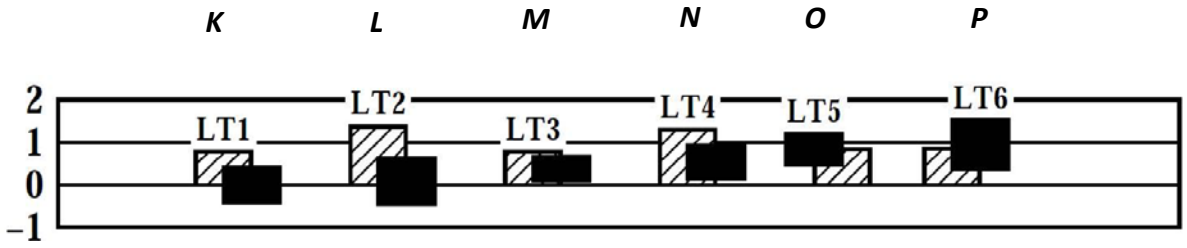
E. depth micrometer; 10.01 mm

$= 9 * 1\ mm = 9\ mm$
$+ 1 * 0.5\ mm = 0.5\ mm$
$+ 49 * 0.01\ mm = 0.49\ mm$
$= \mathbf{9.99\ mm}$

Note how the gage is read from right to left and from top to bottom



Questions 14-15. Consider the diagram below and answer the questions.



A

14. **Figure above shows different … fits; fit … has the largest hole tolerance.**

A. transition; *L* (***slide 3.22; also: handout "Fits US tables…", pp. 633, 638***)

B. shrink; P

C. interference locational; L

D. interference locational; N

E. transition; M

D

15. **What is true about fit *O*?**

A. $shaft_{LMC} > hole_{LMC} > shaft_{MMC} > hole_{MMC}$

B. $hole_{LMC} > shaft_{MMC} > shaft_{MMC} > hole_{MMC}$

C. $shaft_{MMC} > shaft_{LMC} > hole_{LMC} > hole_{MMC}$

D. $shaft_{MMC} > hole_{LMC} > shaft_{LMC} > hole_{MMC}$

(***slide 3.26; also: handout "Fits US tables…", pp. 633, 640-1***)

E. $hole_{LMC} > hole_{MMC} > shaft_{MMC} > shaft_{LMC}$

Questions 16 - 19. Consider a $6.\frac{5}{16}$" nominal diameter, $FN2$ fit between a shaft and hole.

16. **Respectively,** $shaft_{MMC}$ =; $shaft_{LMC}$ =…

B

A. 6.3170 in; 6.3180 in

B. 6.3180 *in*; 6.3170 *in*

C. 6.3175 in; 6.3165 in

D. 6.3141 in; 6.3125 in

E. 6.3125 in; 6.3141 in

$shaft_{MMC} = 6.3125 + 0.0055 = \mathbf{6.3180}$;

$shaft_{LMC} = 6.3125 + 0.0045 = \mathbf{6.3170}$

17. **Respectively,** $hole_{MMC}$ =; $hole_{LMC}$ =…

E

A. 6.3170 in; 6.3180 in

B. 6.3180 in; 6.3170 in

C. 6.3175 in; 6.3165 in

D. 6.3141 in; 6.3125 in

E. 6.3125 *in*; 6.3141 *in*

$hole_{MMC} = 6.3125 + 0 = \mathbf{6.3125}$;

$hole_{LMC} = 6.3125 + 0.0016 = \mathbf{6.3141}$

18. **Respectively,** $shaft\ tolerance$ =; $hole\ tolerance$ =…

C

A. 0.0055 in; 0.0029 in

B. 0.0012 in; 0.0018 in

C. 0.0010 *in*; 0.0016 *in*

D. 0.0016 in; 0.0010 in

E. 0.0018 in; 0.0012 in

$shaft_{tol} = \frac{+5.0 - (+4.0)}{1000} = \mathbf{0.0010}$;

$hole_{tol} = \frac{+1.6 - 0}{1000} = \mathbf{0.0016}$

Nominal Size Range, Inches		Class FN 2		
		Interference[a]	Standard Tolerance Limits	
			Hole H7	Shaft s6
Over	To			Values
4.73–	5.52	1.9 4.5	+1.6 0	+4.5 +3.5
5.52–	6.30	2.4 5.0	+1.6 0	+5.0 +4.0
6.30–	7.09	2.9 5.5	+1.6 0	+5.5 +4.5

D

19. **Respectively,** $min.intereference =$; $max.intereference =$ **…**

A. $0.0050\ in;\ 0.0024\ in$

B. $0.0024\ in;\ 0.0050\ in$

C. $0.0055\ in; 0.0029\ in$

D. $\mathbf{0.0029\ in;\ 0.0055\ in}$

E. $0.0032\ in;\ 0.0062\ in$

$$int_{min} = \frac{+4.5 - (+1.6)}{1000} = \mathbf{0.0029};$$

$$int_{max} = \frac{+5.5 - 0}{1000} = \mathbf{0.0055}$$

A

20. **What application can this $FN2$ fit be best used in?**

A. application requiring a constant drive pressure resulting in a permanent assembly (*slide 3.26*)

B. application where a small amount of clearance or interference is permissible

C. application where accuracy of location is of prime importance

D. application where it is intended to provide a running performance between two parts

E. application where parts can be freely assembled or disassembled