IE-352
Section 1, CRN: 32997
Section 2, CRN: 5022
Second Semester 1431-32 H (Spring-2011) – 4(4,1,1)
MANUFACTURING PROCESSES - 2

Wednesday, Apr 20, 2011 (16/5/1432H)
Midterm 1 [10 POINTS] ANSWERS

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Place the correct letter in the box at the right of each question [½ Point Each] 5.21.11

1. **Which of the following IS NOT true regarding "Manufacturing"?** [B]
   a. it makes technology possible
   b. it involves organizations that produce or supply services ← industry slide 10
   c. it is a way by which nations generate wealth
   d. it involves the use of mechanized and automated equipment
   e. it involves making a product from raw materials

2. **Which of the following is a non-homogenous mixture of basic materials?** [E]
   a. Alloy
   b. Metal
   c. Ceramic
   d. Polymer
   e. Composite ← (slide 27)

3. **Which of the following is an example of a material removal process?** [C]
   a. Extrusion
   b. Casting
   c. Turning ← (slide 38)
   d. Forging
   e. Molding

D

4. **Which of the following is an example of an assembly operation?**
   a. Drilling
   b. Sintering
   c. Surface Treatment
   d. Press fitting ← (slide 42)
   e. Coating

D

5. **A manufacturing support system …**
   a. involves the way equipment is arranged in the factory
   b. includes automated production lines
   c. involves low, medium, and high production
   d. involves product planning and quality control ← (slide 53)
   e. includes production facilities that touch the product

E

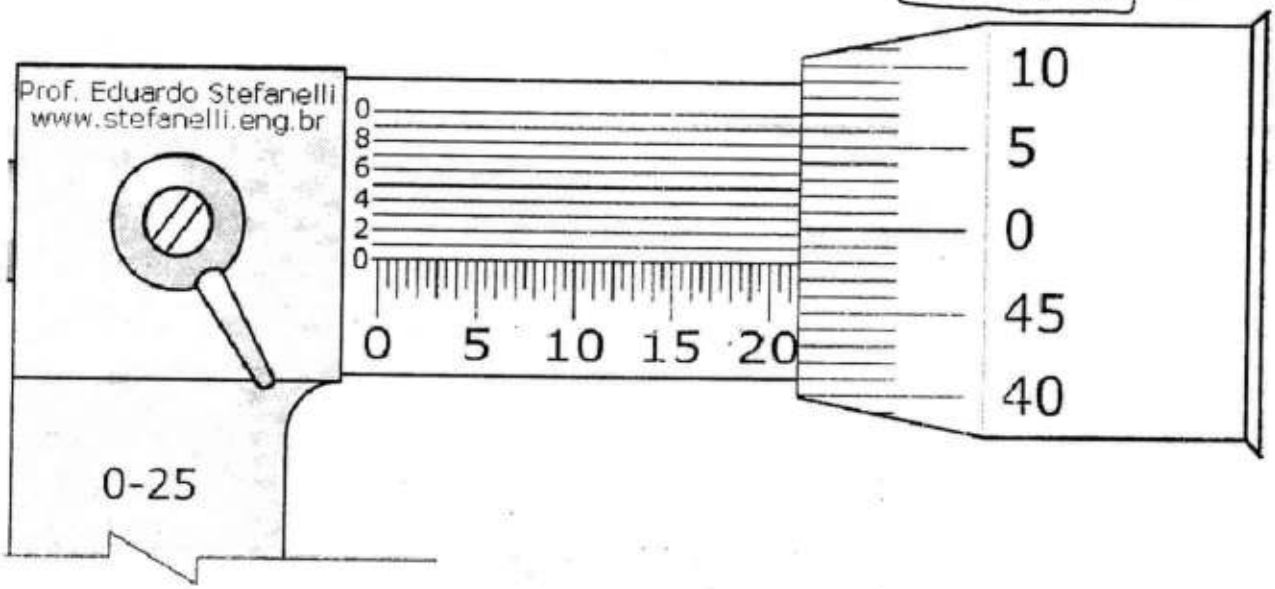
6. **The correct reading in the gage shown below is …**

a. 20.479 *mm*
b. 21.459 *mm*
c. 22.479 *mm*
d. 2.2459 *mm*
e. 21.479 *mm* ←

unit: mm

	Accuracy	Reading
Sleeve	1 mm	21 : 21 mm
	0.5 mm	0 : 0
Thimble	0.01 mm	47 : 0.47 mm
	0.001 mm	9 : 0.009 mm

21.479 mm



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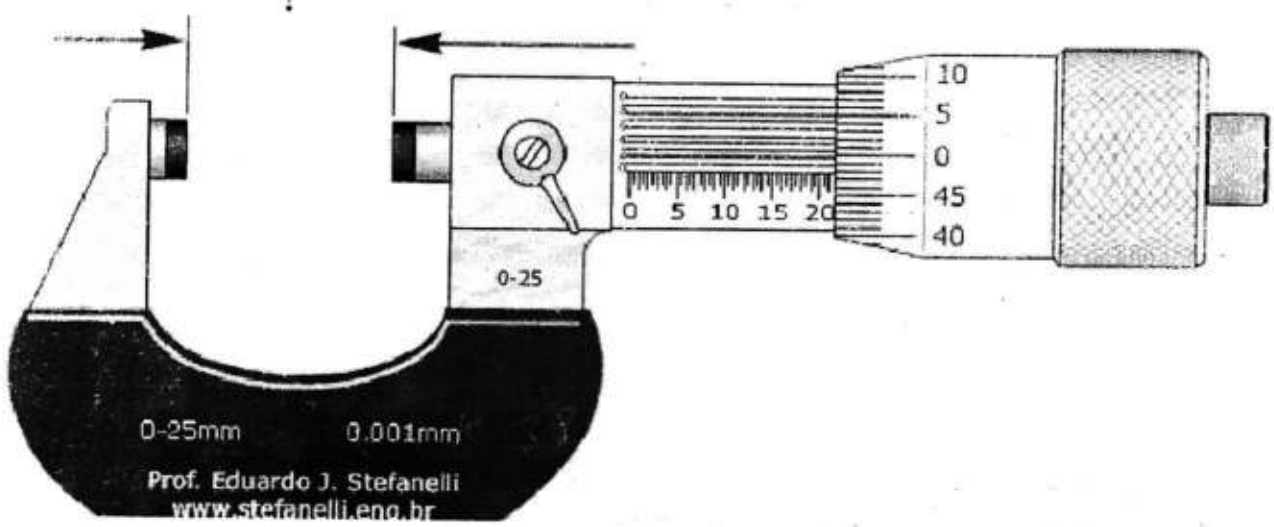
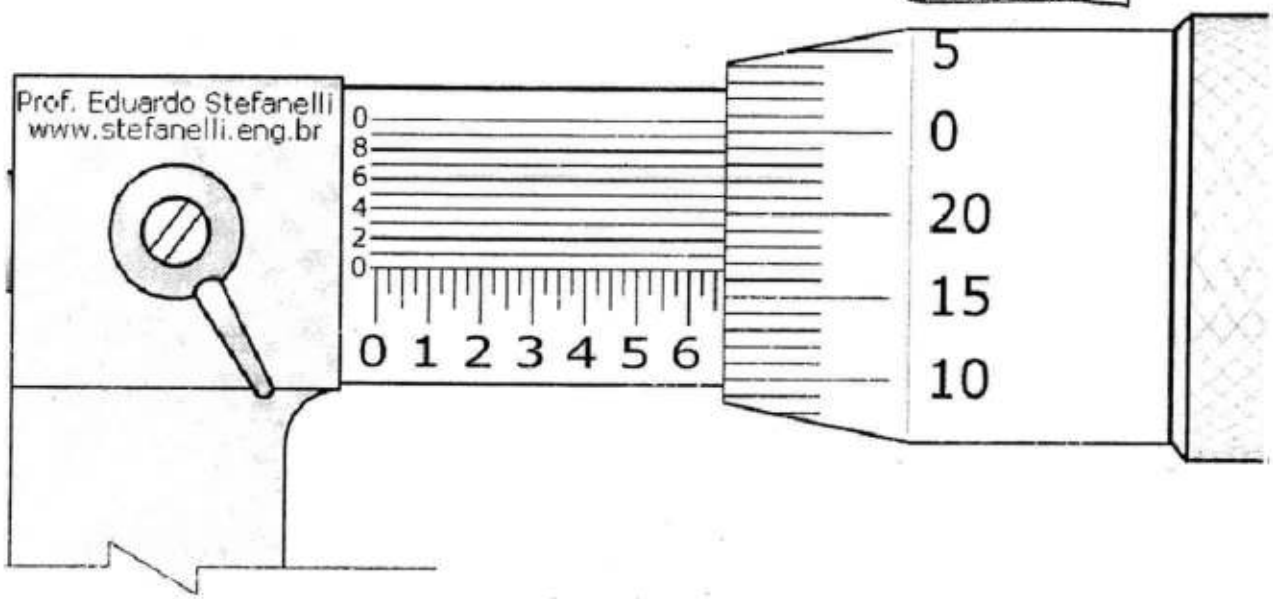


A

7. **The correct reading in the gage shown below is …**

a. 0.6666 *in* ←
b. 6.5156 *in*
c. 0.7166 *in*
d. 0.6046 *in*
e. 7.5156 *in*

	units: in	Accuracy	Reading	
Sleeve		0.1 in	6	: 0.6 in
		0.025 in	2	: 0.050 in
Thimble		0.001 in	16	: 0.016 in
		0.0001 in	6	: 0.0006 in
				0.6666 in



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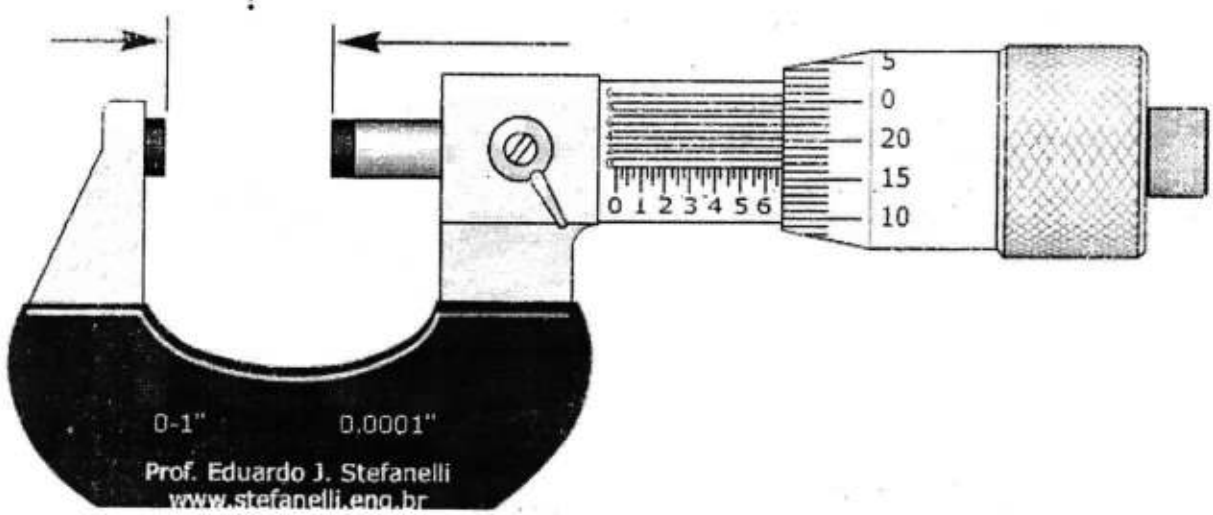


B

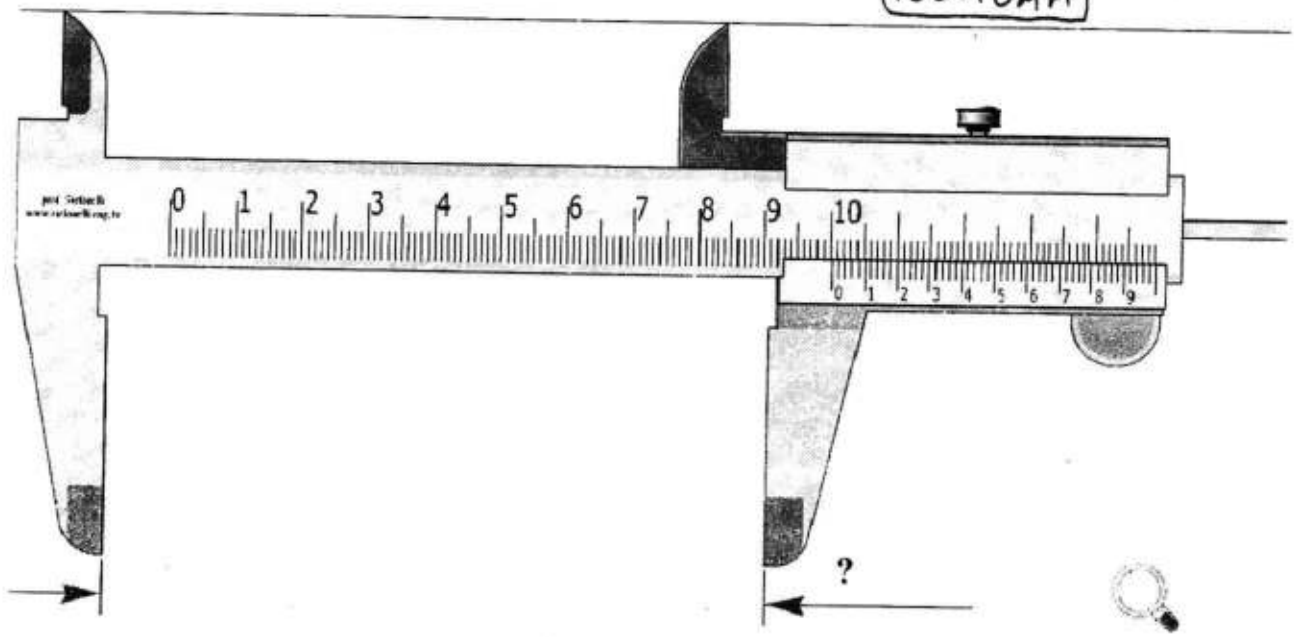
8. **The correct reading in the gage shown below is …**

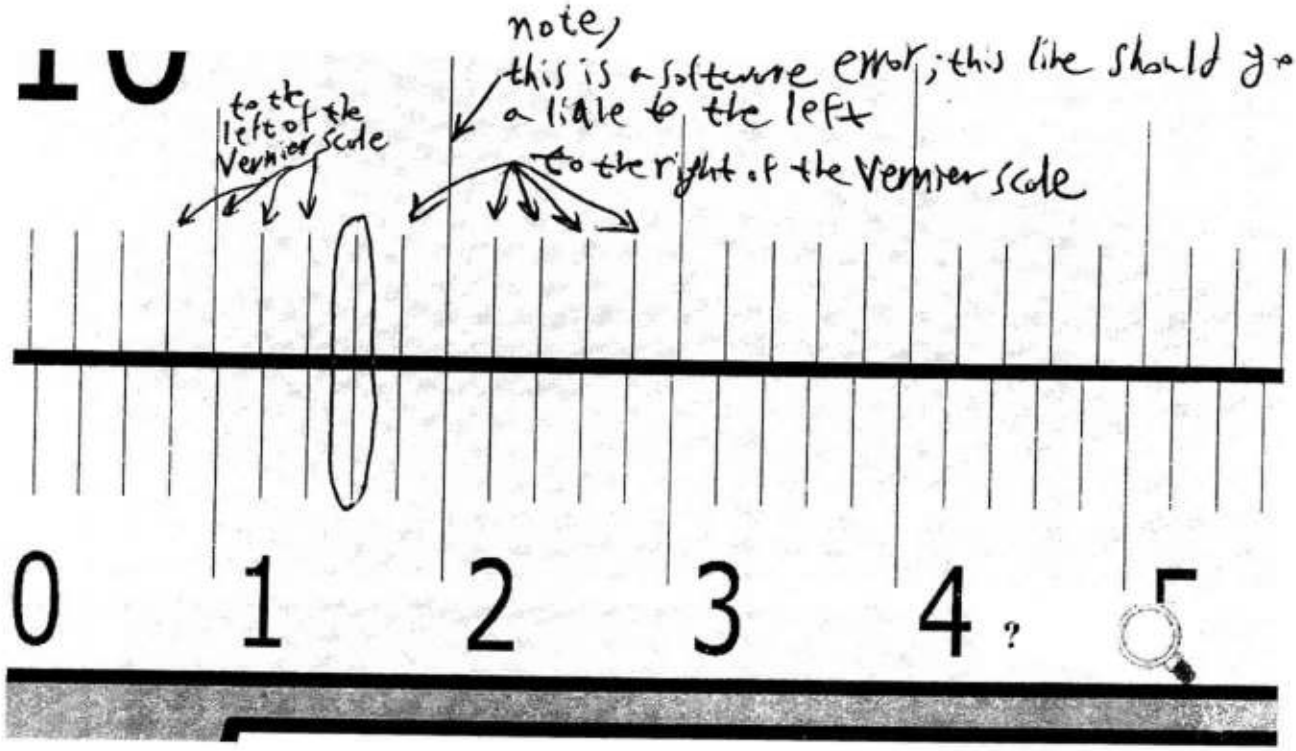
a. 100.06 *mm*
b. 100.16 *mm* ←
c. 10.06 *mm*
d. 10.016 *mm*
e. 100.26 *mm*

units : mm

	Accuracy	Reading
Main Scale	10 mm	10 : 100 mm
	1 mm	0 : 0
Vernier Scale	0.1 mm	1 : 0.1 mm
	0.02 mm	3 : 0.06 mm

100.16 mm





A

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

a. 1.900 *in* ← Unit: in

b. 1.925 *in*

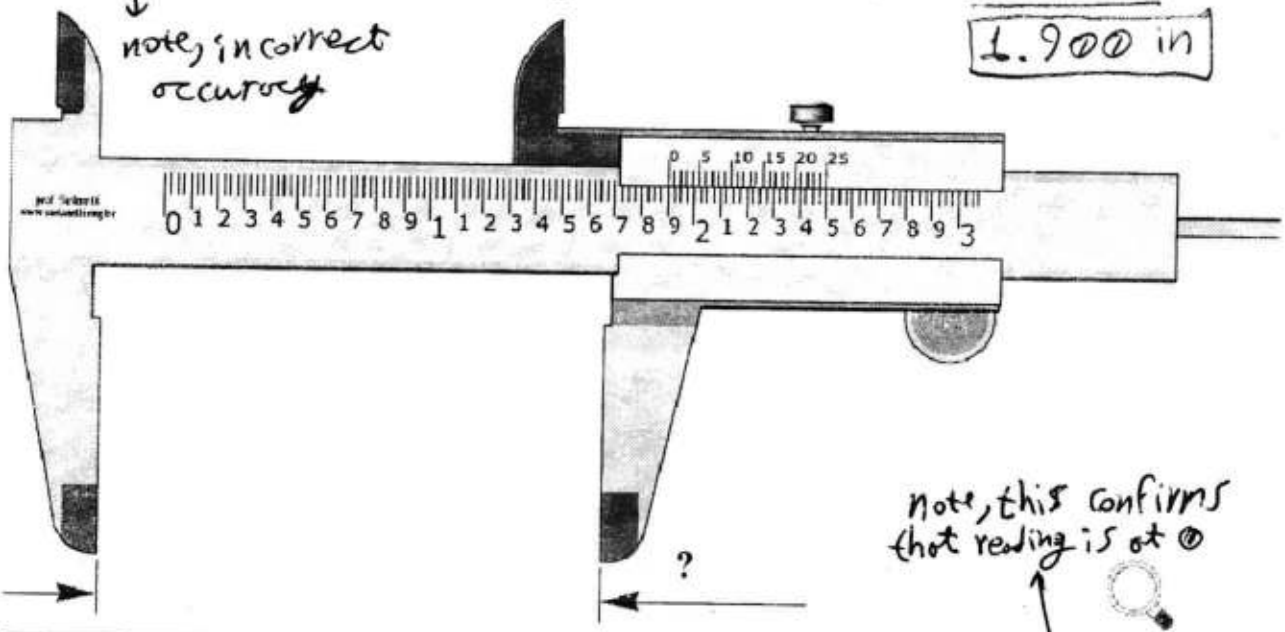
c. 19.25 *in*

d. 0.1925 *in*

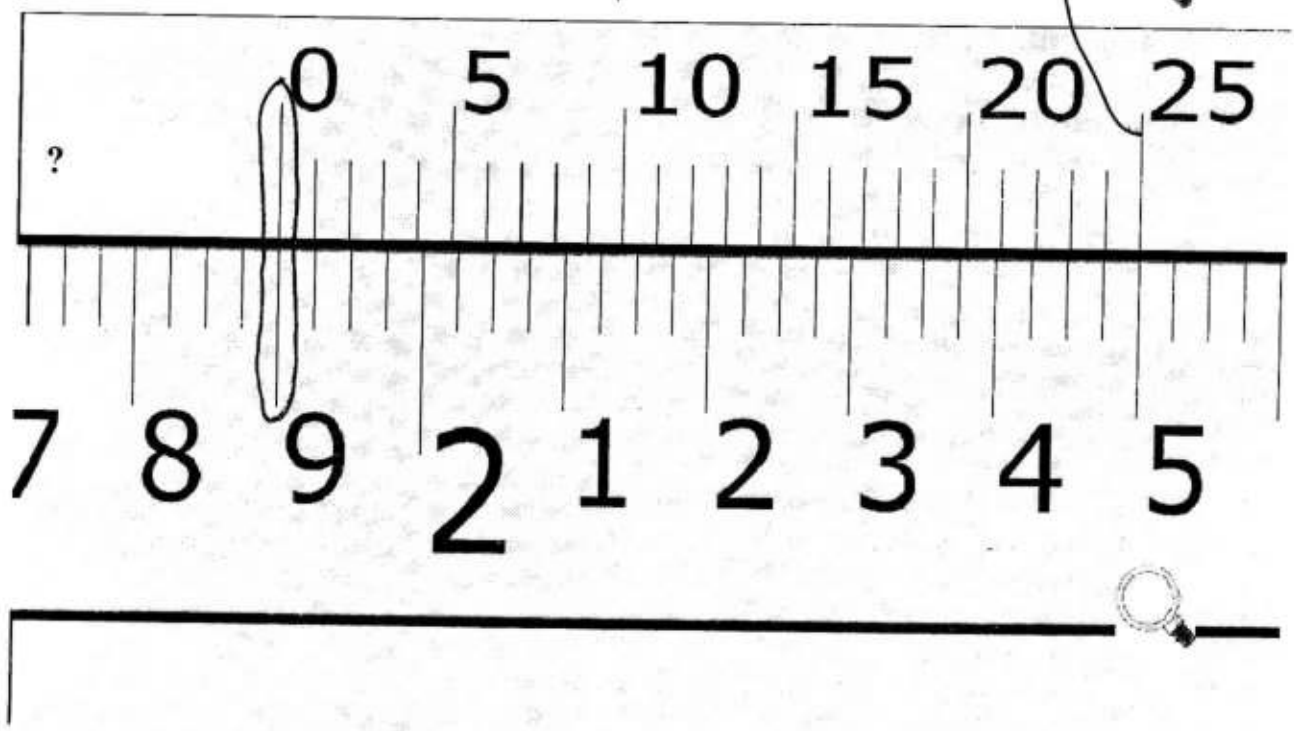
e. 1.90 *in*

		Accuracy	Reading
Main Scale	1 in	1	: 1 in
	0.1 in	9	. 0.9 in
Vernier Scale	0.025	0	: 0
	0.001	0	: 0.000
			1.900 in

note, incorrect accuracy



note, this confirms that reading is at 0



10. **The following applies for the gage below with tolerance range: 1.5150-5 mm ...** C

a. A: go gage (1.5150 *mm*); B: no-go gage (1.5155 *mm*); C: rejected

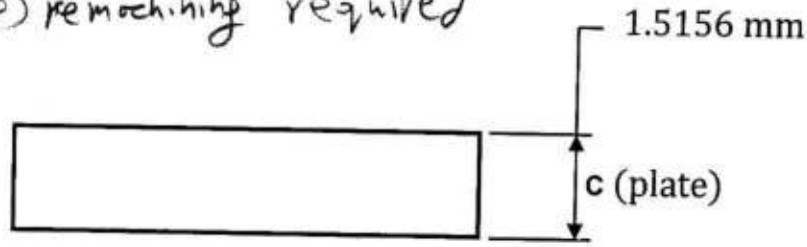
b. A: go gage (1.5155 *mm*); B: no-go gage (1.5150 *mm*); C: rejected

c. A: go gage (1.5155 *mm*); B: no-go gage (1.5150 *mm*); C: re-machining required ←

d. A: go gage (1.5155 *mm*); B: no-go gage (1.5150 *mm*); C: accepted

e. A: no-go gage (1.5150 *mm*); B: go gage (1.5155 *mm*); C: re-machining required

A: Go gage ⇒ max. allowance = 1.5155mm
B: No-go gage ⇒ min allowance = 1.5150 mm
C = 1.5156 mm > A
⇒ A: not accepted (too big)
⇒ remachining required



11. **Which of the following applies to a BASIC SHAFT system?** D

a. basic size = minimum hole size; basic size - allowance = maximum shaft size

b. basic size = maximum hole size; basic size - allowance = minimum shaft size

c. basic size = minimum shaft size; allowance + basic size = maximum hole size

d. basic size = maximum shaft size (Shaft MMC ↓); allowance + basic size = minimum hole size (Hole MMC ↓) ←

e. basic size = minimum shaft size; allowance + basic size = minimum hole size

12. **What is true below about a LT 3 fit?** E

L ↓ location Fit

T ↘ transition (i.e between clearance & interference)

a. it is a type of interference/shrink fit

b. it is a type of running clearance fit

c. it is a type of location clearance fit

d. it is a type of location interference fit

e. it is included within the broad range of fits running between clearance and interference ←

Questions 13-15. Consider a $1\frac{1}{8}$" nominal diameter RC 6 fit between a shaft and a hole.

Basic hole system. Limits are in thousandths of an inch.

Nominal Size Range in Inches	Class RC 1			Class RC 2			Class RC 3			Class RC 4			Class RC 5			Class RC 6		
	Limits of Clearance	Standard Limits		Limits of Clearance	Standard Limits		Limits of Clearance	Standard Limits		Limits of Clearance	Standard Limits		Limits of Clearance	Standard Limits		Limits of Clearance	Standard Limits	
		Hole H5	Shaft g4		Hole H6	Shaft g5		Hole H7	Shaft f6		Hole H8	Shaft f7		Hole H8	Shaft e7		Hole H9	Shaft e8
0 - 0.12	0.1 0.45	+0.2 -0	-0.1 -0.25	0.1 0.55	+0.25 -0	-0.1 -0.3	0.3 0.95	+0.4 -0	-0.3 -0.55	0.3 1.3	+0.6 -0	-0.3 -0.7	0.6 1.6	+0.6 -0	-0.6 -1.0	0.6 2.2	+1.0 -0	-0.6 -1.2
0.12 - 0.24	0.15 0.5	+0.2 -0	-0.15 -0.3	0.15 0.65	+0.3 -0	-0.15 -0.35	0.4 1.12	+0.5 -0	-0.4 -0.7	0.4 1.6	+0.7 -0	-0.4 -0.9	0.8 2.0	+0.7 -0	-0.8 -1.3	0.8 2.7	+1.2 -0	-0.8 -1.5
0.24 - 0.40	0.2 0.6	+0.25 -0	-0.2 -0.35	0.2 0.85	+0.4 -0	-0.2 -0.45	0.5 1.5	+0.6 -0	-0.5 -0.9	0.5 2.0	+0.9 -0	-0.5 -1.1	1.0 2.5	+0.9 -0	-1.0 -1.6	1.0 3.3	+1.4 -0	-1.0 -1.9
0.40 - 0.71	0.25 0.75	+0.3 -0	-0.25 -0.45	0.25 0.95	+0.4 -0	-0.25 -0.55	0.6 1.7	+0.7 -0	-0.6 -1.0	0.6 2.3	+1.0 -0	-0.6 -1.3	1.2 2.9	+1.0 -0	-1.2 -1.9	1.2 3.8	+1.6 -0	-1.2 -2.2
0.71 - 1.19	0.3 0.95	+0.4 -0	-0.3 -0.55	0.3 1.2	+0.5 -0	-0.3 -0.7	0.8 2.1	+0.8 -0	-0.8 -1.3	0.8 2.8	+1.2 -0	-0.8 -1.6	1.6 3.6	+1.2 -0	-1.6 -2.4	1.6 4.8	+2.0 -0	-1.6 -2.8
1.19 - 1.97																		
1.97 - 3.15																		

*From ANSI B4.1--1967 (R 1987). Larger diameters and RC 7 through RC 9 not included in this presentation.

1.125 in

13. **The basic size (BS) is …**

C

$BS = 1\frac{1}{8}" = \frac{9}{8}" = 1.1250$ in

a. 0.8889 *in*
b. 0.1125 *in*
c. 1.1250 *in* ←
d. 0.1125 *in*
e. 0.1250 *in*

error

Basic Hole system → A

14. **Respectively, Shaft MMC =; Shaft LMC = …**

a. 1.1234 *in*; 1.1222 *in*
b. 1.1266 *in*; 1.1278 *in*
c. 1.1250 *in*; 1.1230 *in*
d. 1.1250 *in*; 1.1270 *in*
e. 1.1230 *in*; 1.1250 *in*

Shaft: MMC = 1.1250 in − 0.0016 = 1.1234 in

Hole: LMC = 1.1250 in + 0.0020 = 1.1270 in

Check clearance = 0.0036 in

Shaft: LMC = 1.1250 in − 0.0028 = 1.1222 in

Hole: MMC = BS = 1.1250 − 0 = 1.1250 in → D

Check clearance = 0.0048 in

15. **Respectively, Hole MMC =; Hole LMC = …**

a. 1.1234 *in*; 1.1222 *in*
b. 1.1266 *in*; 1.1278 *in*
c. 1.1250 *in*; 1.1230 *in*
d. 1.1250 *in*; 1.1270 *in*
e. 1.1230 *in*; 1.1250 *in*

16. **Classify the following geometric tolerances: symmetry; angularity; cylindricity:** B

a. orientation tolerance; position tolerance; form tolerance
b. position tolerance; orientation tolerance; form tolerance
c. form tolerance; position tolerance; orientation tolerance
d. orientation tolerance; form tolerance; position tolerance
e. position tolerance; orientation tolerance; position tolerance

symmetry : position
angularity : orientation
cylindricity : form

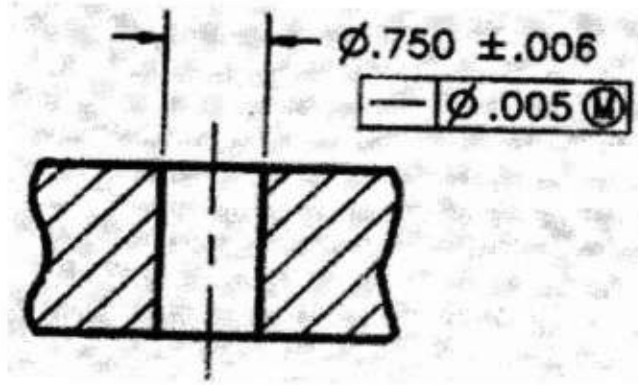
17. **The symbol ▱ refers to the following geometric tolerance:** C

a. straightness
b. parallelism
c. flatness ←
d. symmetry
e. position

18. **When a geometric tolerance is specified regardless of feature size …** B

a. the letters **RFS** are written inside the reference control frame
b. no special symbol is indicated next to the tolerance value ← (ey slide 20, 21, 22, 23)
c. the letter **M** is written inside a circle next to the tolerance value (M)
d. the letter **S** is written inside a circle next to the tolerance value (S)
e. the letter **L** is written inside a circle next to the tolerance value (L)

Questions 19-20. Consider the figure below and answer the questions that follow.



19. V_C =

a. 0.739 ←
b. 0.749
c. 0.750
d. 0.751
e. 0.761

unit: mm; hole
BS = 0.750 mm
MMC = BS − Size Tol.
= 0.750
− 0.006
0.744 mm
V_C = MMC − Geom. Tol = 0.744 mm − 0.005
0.739 mm

A

20. **What is the value of the geometric tolerance given $BS = 0.753\ mm$**

a. 0.005 *mm*
b. 0.017 *mm*
c. 0.006 *mm*
d. 0.011 *mm*
e. 0.014 *mm* ←

BS = 0.753 mm
Geom. Tol. = BS − V_C (min size)
= 0.753 mm
− 0.739 mm
0.014 mm

E

note, see slide 18 for more details.