



คณะวิศวกรรมศาสตร์
มหาวิทยาลัยสงขลานครินทร์

การสอบปลายภาค ประจำปีการศึกษาที่ 2

วันที่ 26 กุมภาพันธ์ 2556

วิชา 226 – 301 Advanced Manufacturing Technology

ประจำปีการศึกษา 2555

เวลา 09.00 – 12.00 น.

ห้อง Robot

คำสั่ง

- ข้อสอบมีทั้งหมด21.... ข้อ ในกระดาษคำถาม15.... หน้า (รวมปก)
- ห้ามการหยิบยืมสิ่งใดๆ จากผู้อื่นๆ เว้นแต่ผู้คุมสอบจะหยิบยืมให้
- ห้ามนำส่วนใดส่วนหนึ่งของข้อสอบออกจากห้องสอบ
- เขียนชื่อ - สกุล และรหัสนักศึกษาทุกหน้าของข้อสอบ
- อนุญาต ให้นำ ตำรา เอกสาร เครื่องคิดเลข พจนานุกรม รุ่นใดๆ เข้าห้องสอบ
- ให้ทำข้อสอบโดยใช้ปากกา หรือ ดินสอ

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

Name Student ID Section

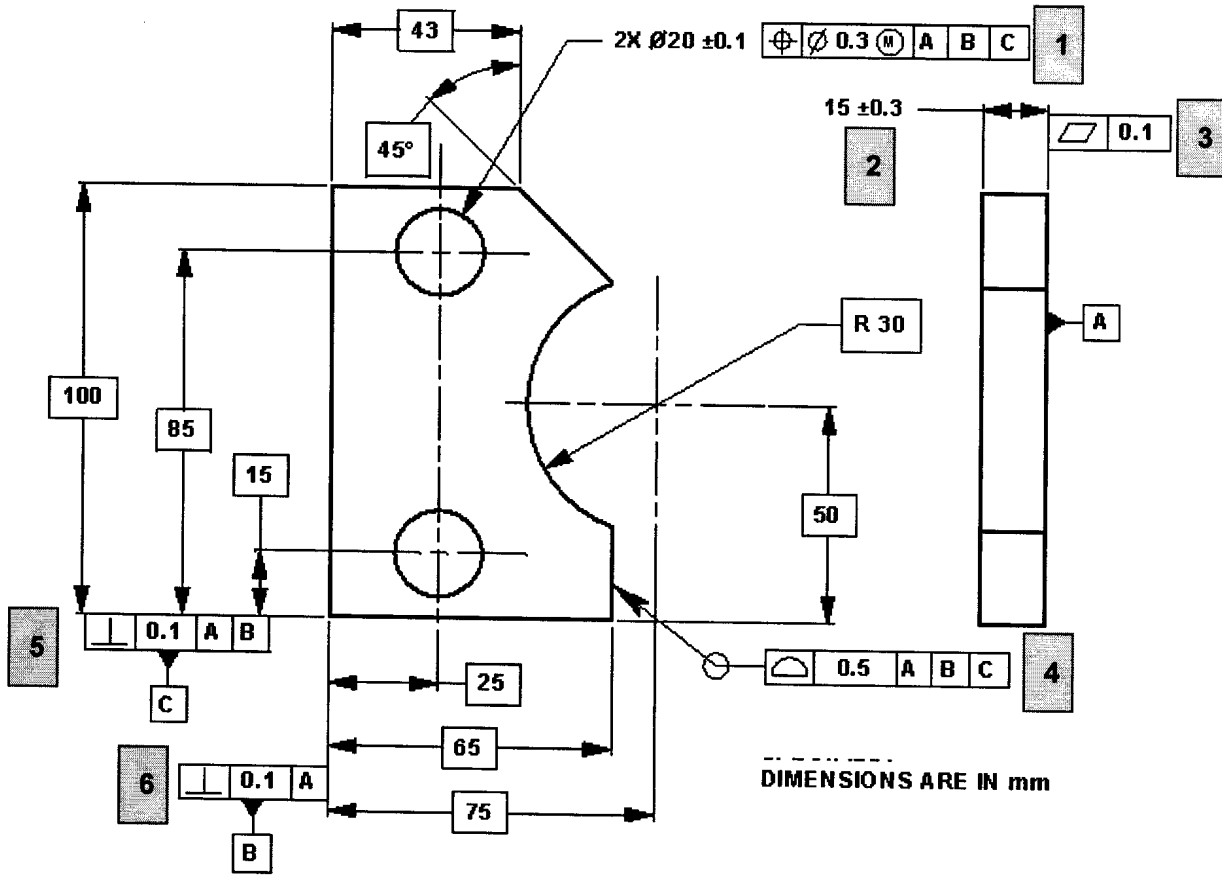
ผู้ออกข้อสอบ กุลภัสร์ ทองแก้ว

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Question	Full Score	Assigned Score
1	3	
2	3	
3	3	
4	10	
5	4	
6	6	
7	3	
8	5	
9	9	
10	5	
11	6	
12	3	
13	3	
14	15	
15	3	
16	5	
17	3	
18	3	
19	3	
20	5	
21	20	
Total	120	

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4. (10 points) Explain Geometric Dimensioning and Tolerancing (GD&T) of the workpiece from the figure following the numbers.



Geometric Dimension

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Geometric Tolerance

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5. (4 points) What are the components of composite material? Explain.

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6. (6 points) Composite material can be classified into three groups; MMC, PMC and CMC.

How are they different? Give the applications of these composite materials.

MMC

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PMC

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CMC

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7. (3 points) What are advantages of metal alloy comparing metal materials?

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8. (5 points) To explain the characteristics and give applications of smart materials.

Characteristics

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Applications

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9. (9 points) To explain the characteristics and applications of bio-medical materials over three generations.

First generation

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Second generation

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Third generation

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10. (5 points) What are the objectives of destructive test and non-destructive test?

Destructive test

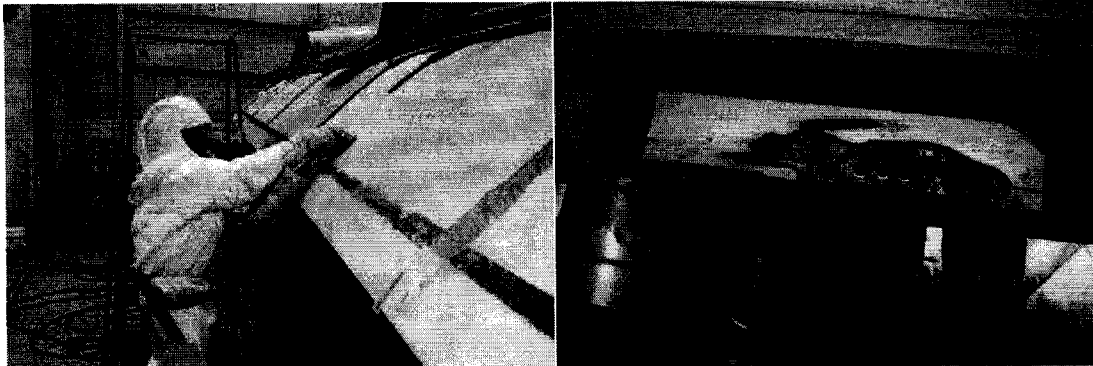
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Non-destructive test

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11 (6 points) From the figure, there is existing corrosion of an aircraft wing. What are the non-destructive tests that can inspect the flaw and measure the lost thickness of the aircraft wing? Give two methods..



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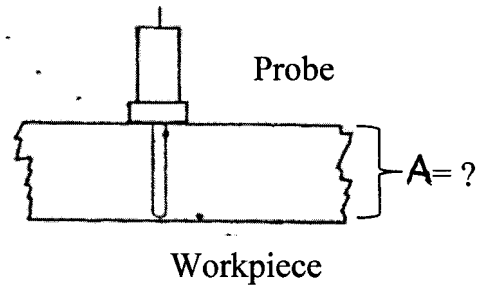
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12. (3 points) From the figure, a steel workpiece is measured the thickness by using ultrasonic inspection. If the time of the reflected sound is $10 \mu s$. What is the thickness of the workpiece?



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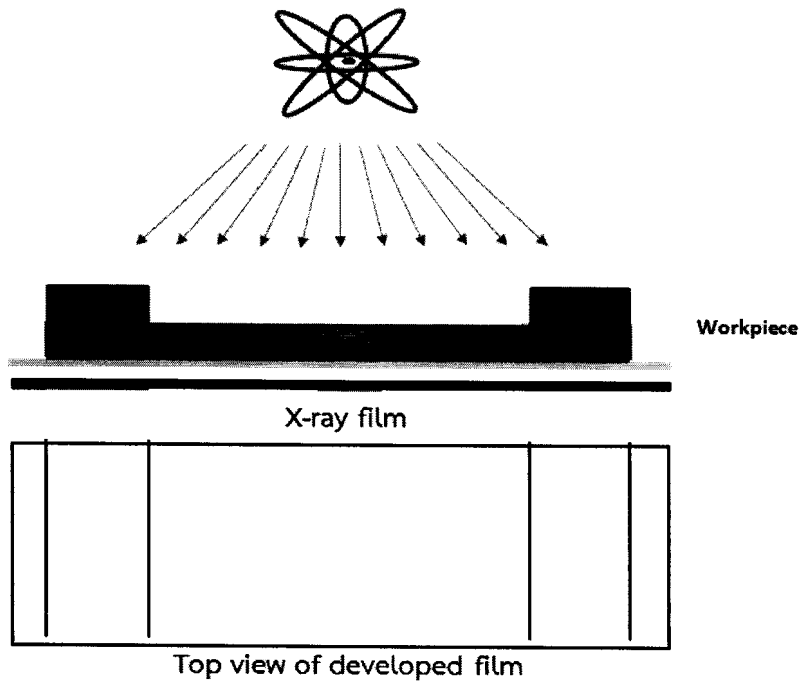
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13. (3 points) From the figure, the amount of radiation reaching the film through the workpiece. Draw darkness (density level) on a top view of the developed film.



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14. (15 points) To study the mechanical properties of aluminum by tensile testing, an aluminum round bar specimen has 20 cm of the initial gauge length (L_0) and 1 cm of the initial diameter (D_0). The specimen is applied by 1000 N axial load. Thus, the length and the diameter are changed to 21.5 cm and 0.75 cm respectively.

- 1) Calculate Engineering Stress-Strain
- 2) Calculate True Stress-Strain
- 3) Calculate % elongation (EL)
- 4) Calculate % reduction of area (AR)
- 5) Is the stress in the aluminum bar elastic or plastic?

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15. (3 points) Do thermoplastic materials have Yield stress (σ_Y). Why?

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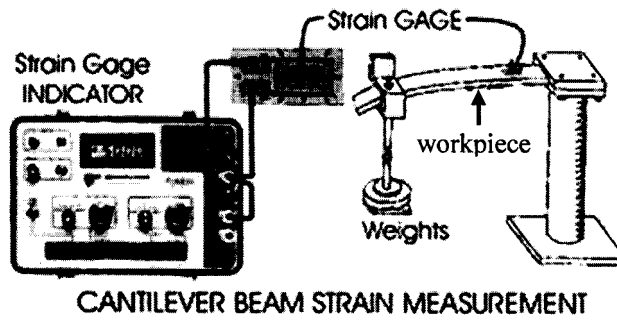
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16. (5 points) From the figure, describe electrical resistance strain gage work for measuring a workpiece.



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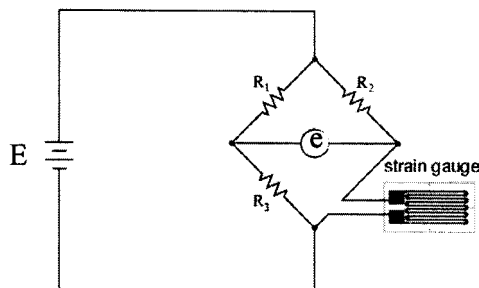
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17. (3 points) How does the Wheatstone bridge circuit work with strain gauge system?



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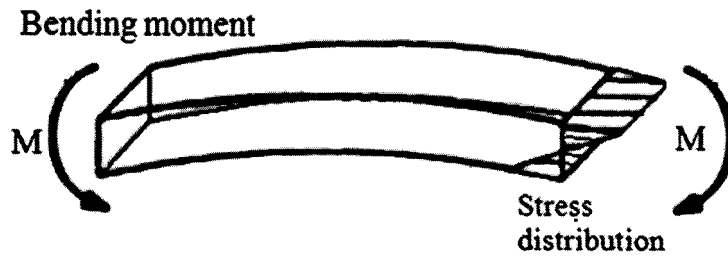
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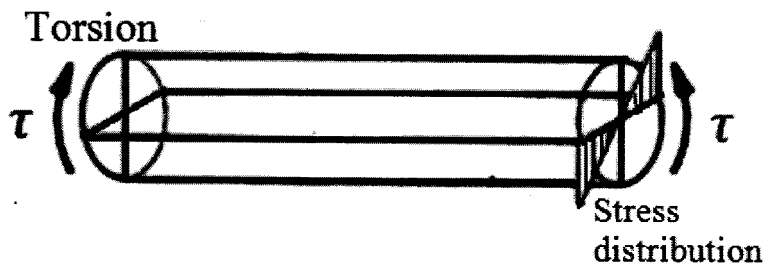
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18. (3 points) If you want to know maximum stress from workpiece 1 (bending test) and workpiece 2 (torsion test). What are characteristics of setting strain gage on the workpieces? Draw the characteristics of setting. Draw on the figures.

Workpiece 1



Workpiece 2



19. (3 points) What are the causes of errors in measurement systems?

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20. (5 points) How dose Coordinate Measuring Machine (CMM) work for measuring a workpiece?

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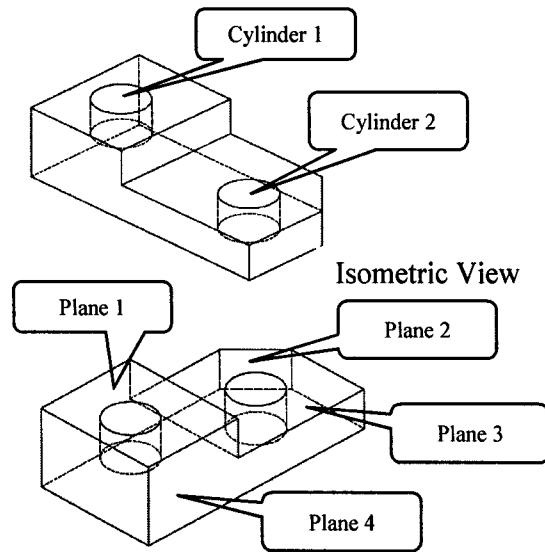
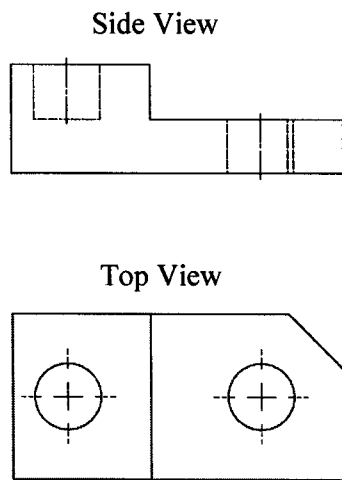
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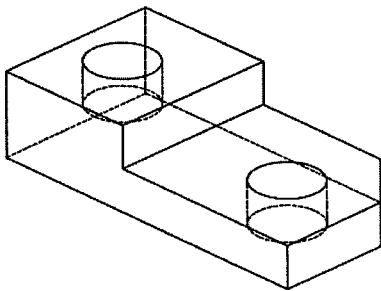
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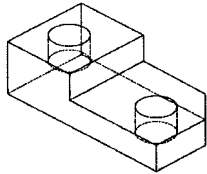
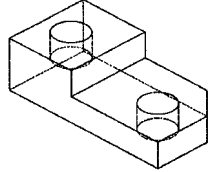
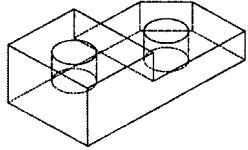
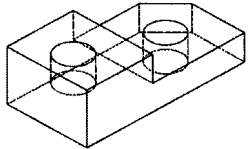
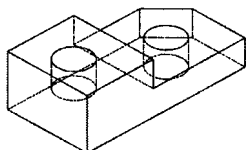
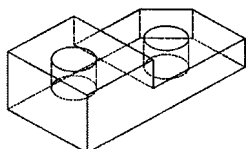
21. (20 points) If you want to find dimension and distance of two cylinders from the workpiece below by using CMM. What is your plan?



1. (5 points) Create Coordinate System



2. (12 points) Measure elements

Element	Memory name	Number of points	Position of the points
Cylinder 1			
Cylinder 1			
Plane 1			
Plane 2			
Plane 3			
Plane 4			

3. (3 points) Analysis

Analysis	First element	Second element
Distance between two cylinders		
Angle between Plane 2 and X-Z Plane		

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