PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester I   Academic Year: 2008

Date: July 31, 2008   Time: 09:00-12:00

Subject: 226-302 Computer Aided Manufacturing   Room: R200

Instructions

- Write your answer in this exam paper only, show your work clearly and legibly.
- Write your name and student ID on every page of the exam paper.
- Dictionary and calculator are NOT allowed.
- There are 11 problems and total score is 180.

> ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทุจริต

Name ....   **Student ID** ....

Question #	Full Score	Assigned Score
1	15	
2	20	
3	19	
4	15	
5	10	
6	15	
7	14	
8	20	
9	20	
10	10	
11	12	
Total	180	

Good Luck

Thanate Ratanawilai

Problem 1. (25 points) Describe the meaning of the following;

    1.1 How are CAD/CAE/CAM/CAPP related?

_____

_____

_____

    1.2 CIM

_____

_____

    1.3 Forward Engineering

_____

_____

    1.4 Reverse Engineering

_____

_____

    1.5 AGV

_____

_____

Problem 2. (10 points)

    2.1 What advantages do numerical control offer over manual methods?

_____

_____

   2.2 What is meant by the terms direct numerical control and distributive numerical control?

_____

_____

Problem 3. (19 points)

    3.1 Match the terms on the left with the definitions on the right:

_____ Chuck	(a) Moves tool into work
_____ Carriage	(b) Supports right end of work
_____ Turret	(c) Clamps the work
_____ Tailstock	(d) Stores and executes CNC programs
_____ MCU	(e) Provides a path for falling chips
_____ Headstock	(f) Machinery to rotate spindle
_____ Slant bed	(g) Holds cutting tools

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3.2 Explain the difference between tool speed and tool feed as regards lathe operations.

_____

_____

Problem 4. (15 points) Choose the proper word from the list to fill up the blank in the figure below;
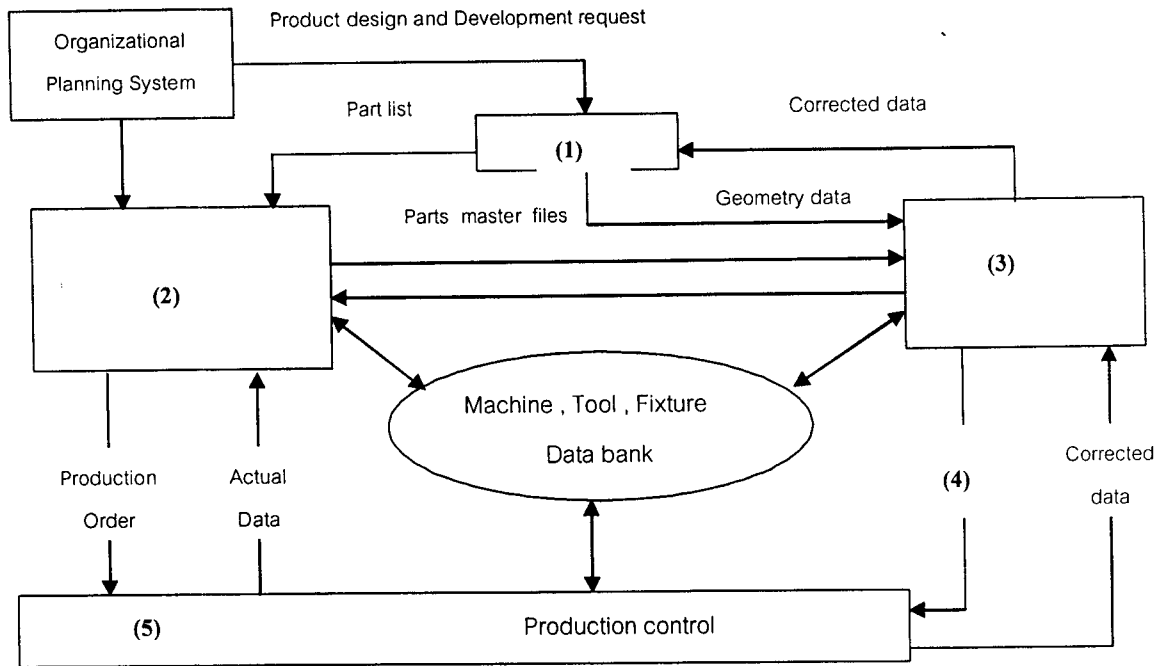
CAD, CAE, CAM, CAPP, MRP, CNC program

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

Problem 5. (20 points)

5.1 What is interpolation? How is it used to cut curves?

_____

_____

5.2 Explain the difference between an open loop system and a closed loop system.

_____

_____

5.3 Spindle movement is primarily along the _____ axis.

5.4 Write the absolute X and Y coordinates of the points shown in the figure below. Also write the incremental X and Y coordinates of the points use the following order: original to PT1, from PT1 to PT2, from PT2 to PT3… finish with PT8.
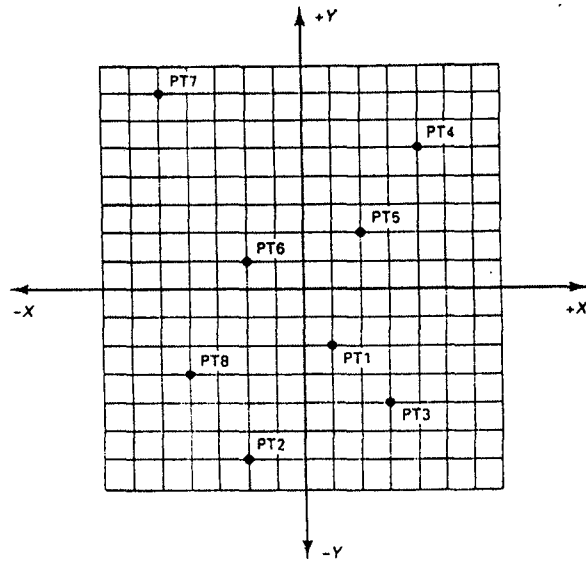
PT	Absolute		Incremental	
	X	Y	X	Y
1				
2				
3				
4				
5				
6				
7				
8				

Problem 6. (10 points)

6.1 Explain an advantage and a disadvantage of using a collet-and-chuck holder as opposed to an end mill holder

_____

_____

_____

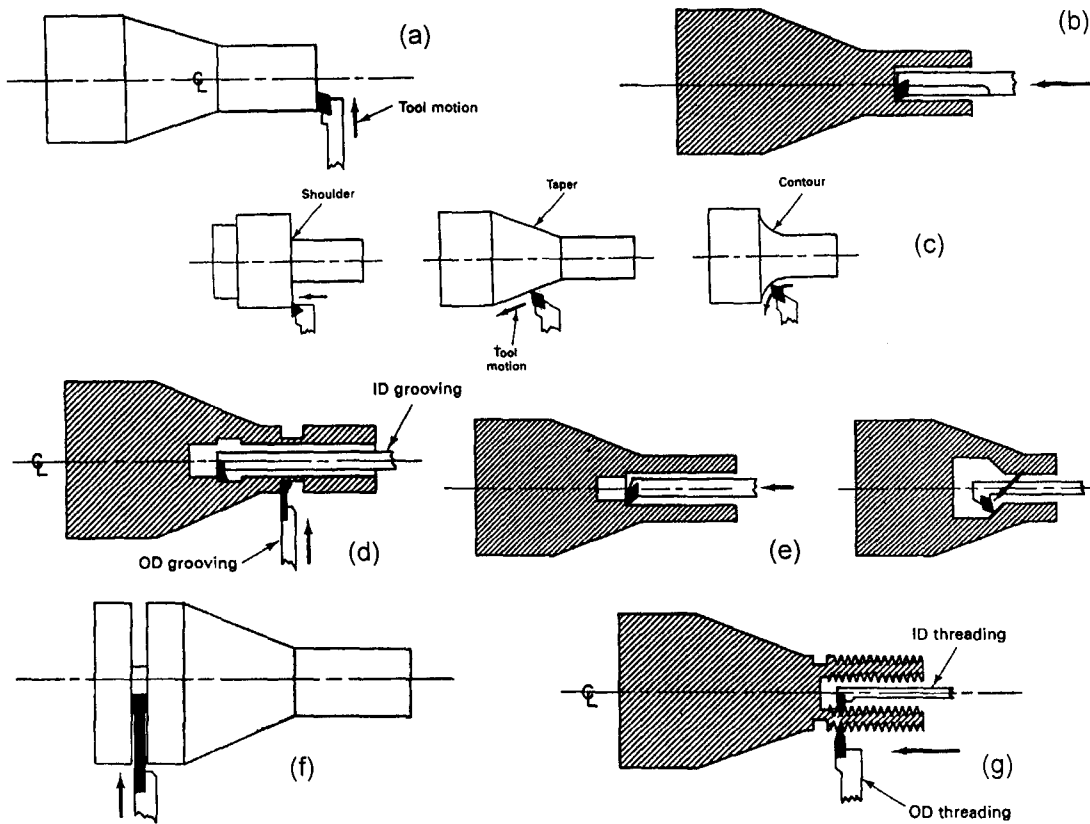6.2 What advantage does a pallet loading mechanism offer to a machining center?

_____

_____

_____

Problem 7. (15 points)

7.1 What is the tool length offset?

_____

_____

_____

7.2 What is the meaning of "Dry run"?

_____

_____

_____

7.3 Why does temperature have such an important effect on the life of cutting tools?

_____

_____

_____

Problem 8. (14 points) What is the operation on the turning machine in the figure below?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

(f) _____

(g) _____

Problem 9. (20 points) A 8 in. long, 0.5 in. diameter 304 stainless steel rod is being reduced in diameter to 0.480 in. by turning with a single pass on a lathe. The spindle rotates at 400 rpm, and the tool is traveling at an axial speed of 6 in./rev. Calculate

9.1 the cutting speed

_____

_____

_____

_____

_____

_____

_____

9.2 time of cut

_____

_____

_____

_____

_____

_____

Problem 10. (10 points) A machining operation is being carried out.

10.1   From figure below, why are cracks on the tool face occurred?

_____

_____

_____
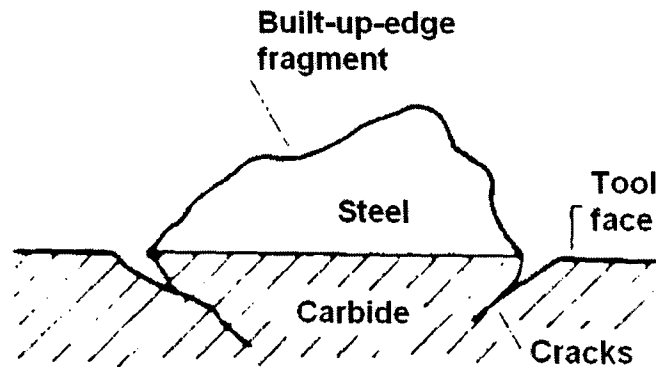
10.2   Discuss cause and effect of BUE tool wear in metal cutting and draw figure to demonstrate your answer.

_____

_____

_____

Problem 11. (12 points) Complete a CNC program to profile mill the contour given in the figure below. Set X_o Y_o at the lower left-hand corner (point A) and Z_o at the top of the part.
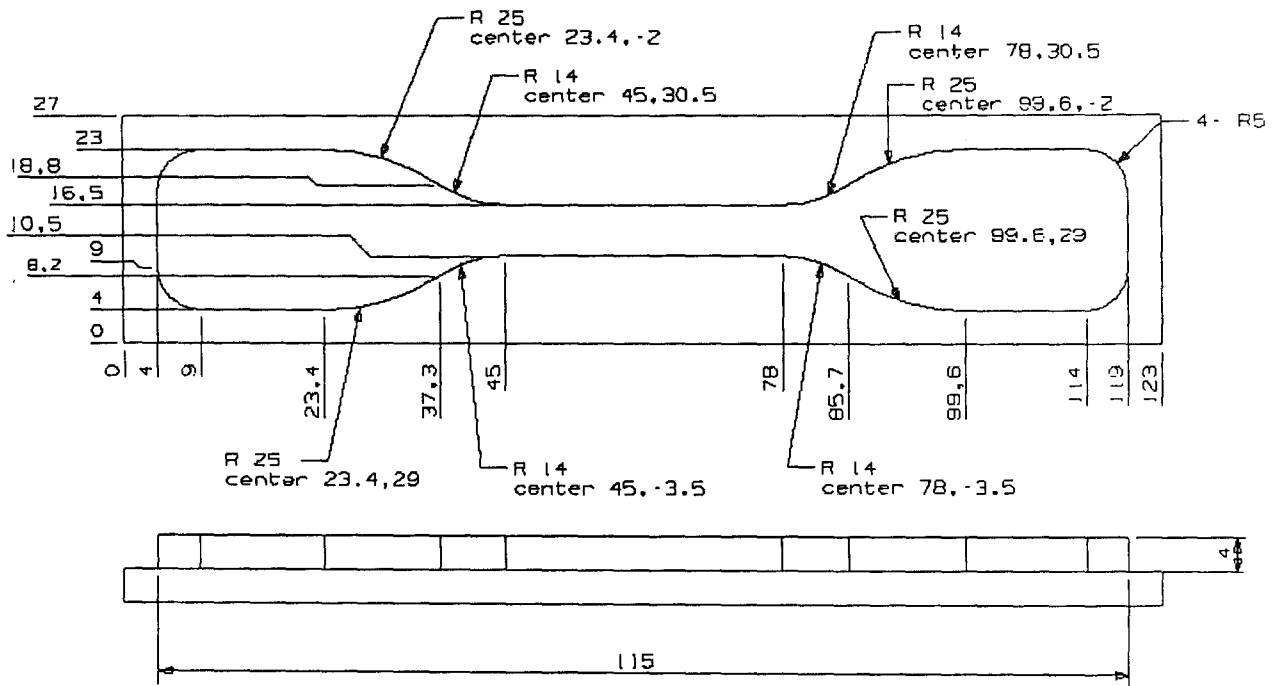
PROGRAM

: G90 G94 G17 G71 G40
T1 ...1..... / (TOOL φ 6)
S 2000 M3
G0 X0 Y0
......2..... G1 X4 Y9 F1000
 G1 Z0 F500   M8
(.....3...., " TEST ")
G91 G1 Z-0.2 F100
G90 G1 Y18 F500
G2 X9 Y23 ......4.... J0
G1 X23.4
G2 X37.3 Y18.8 I....5......   J......6....
G3 X45 Y16.5 P14
......7.......
G3 X85.7 Y18.8 P14
G2 X99.6 Y23 P25

ANSWER

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____
(6) _____
(7) _____

G1 X114
G2 X119 Y18 P5
G1 Y9
G2 X114 Y4 P5
G1 X99.6
G2 X85.7 Y8.2 ... **8**...   (8) _____
G3 X78 Y10.5 P14
· G1 X45
G3 X37.3 Y8.2 P14
G2 X23.4 Y4 P25
G1 X9
G2 X4 Y9 P5
(......**9**......)   (9) _____
(...**10**......., " TEST " , ...**11**......)   (10) _____
G1 Z200 M9   (11) _____
...**12**......   (12) _____
M30