PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Midterm Examination: Semester I — Academic Year: 2009

Date: July 30, 2009 — Time: 09:00-12:00

Subject: 226-302 Computer Aided Manufacturing — Room: R201

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.
- Allow only 1 page of A4 with your own handwriting
- Dictionary and calculator are NOT allowed.
- There are 18 problems and total score is 125.

ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทุจริต

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

Question #	Full Score	Assigned Score	Question #	Full Score	Assigned Score
1	6		10	10	
2	4		11	8	
3	5		12	6	
4	10		13	5	
5	5		14	4	
6	10		15	6	
7	5		16	4	
8	5		17	5	
9	7		18	20	
Total			125		

Good Luck

Thanate Ratanawilai

Student ID .....

1. (6 points) How many types of chip produced during metal cutting? Explain

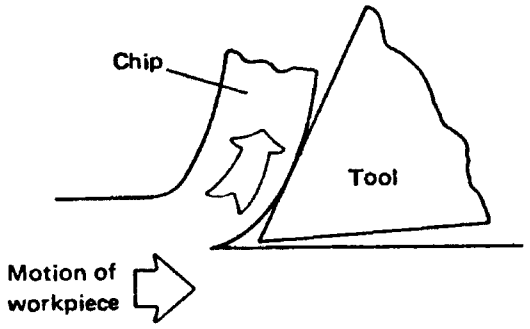
2. (4 points) Different types of chip produced during metal cutting depend on
   (1) _____
   (2)_____
3. (5 points) Is there any advantage in having a built-up edge? Explain.

4. (10 points) Explain the features of different kinds of tool wear.

5. (5 points) Tool life can be almost infinite at low cutting speeds. Would you recommend that all machining be done at low speeds? Explain any limitations on doing so.

Ans 4

6. (10 points) Explain temperature distributions in metal cutting where the heat was generated and transferred to. Draw figure to demonstrate your answer and identify the area of highest temperature.



7. (5 points) Why does temperature have such an important effect on the life of cutting tools?

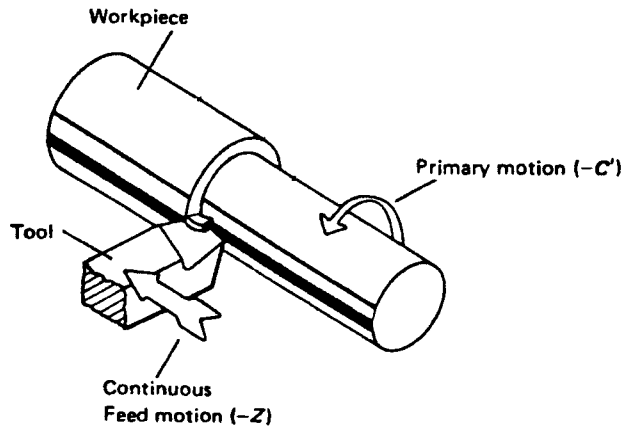
8. (5 points) In metal cutting process, what is the effect of using zero rake angle tooling?

9. (7 points) Match the terms on the left with the definitions on the right:

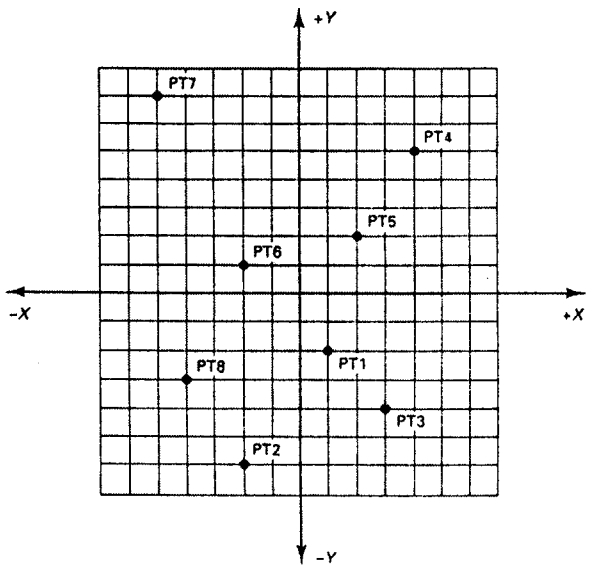
____ MCU	(a) Moves tool into work
____ Carriage	(b) Supports right end of work
____ Turret	(c) Clamps the work
____ Headstock	(d) Stores and executes CNC programs
____ Tailstock	(e) Provides a path for falling chips
____ Chuck	(f) Machinery to rotate spindle
____ Slant bed	(g) Holds cutting tools

Student ID .....

10. (10 points) Determine the time required to take one cut over the stock with a cutting speed of 100 fpm. The diameter piece of work is 3 inch, length is 20 inch, and the feed used is 0.025 inch per revolution.

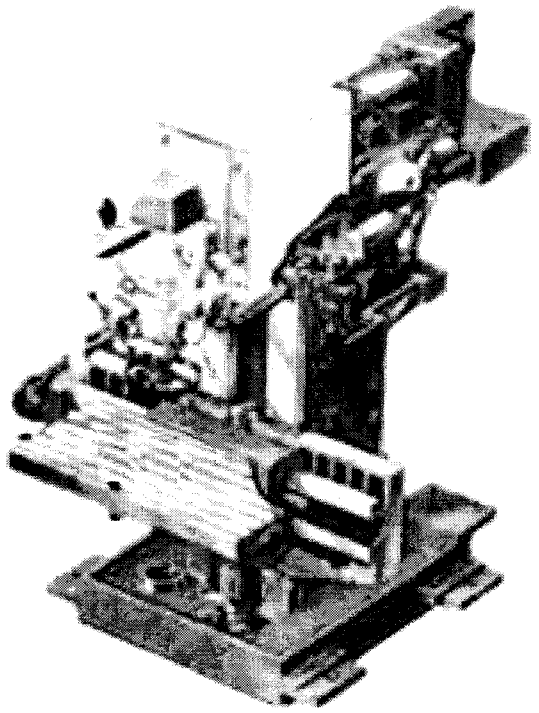


11. (8 points) Write the absolute X and Y coordinates of the points shown in the figure below. Also write the incremental X and Y coordinates of the points use the following order: original to PT1, from PT1 to PT2, from PT2 to PT3... finish with PT8.



PT	Absolute		Incremental	
	X	Y	X	Y
1				
2				
3				
4				
5				
6				
7				
8				

12. (6 points) Indicate X, Y, and Z axis of the machine below.



13. (5 points) What improvements do CNC machines offer over traditional NC machines?

_____

_____

_____

14. (4 points) Name four requirements that must be satisfied prior to using CNC in a shop.

_____

_____

_____

_____

15. (6 points) Define the terms machine home, part origin, and tool change position.

_____

_____

_____

_____

_____

_____

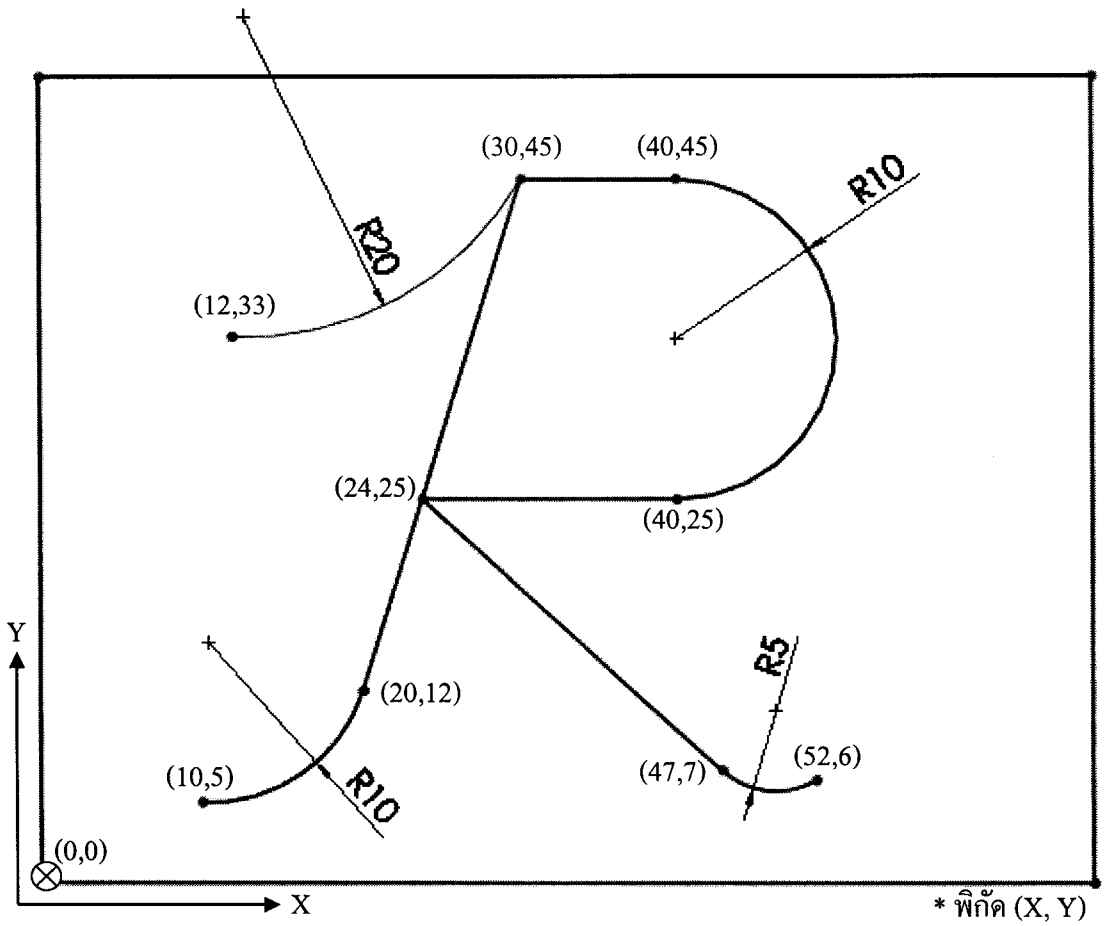
16. (4 points) Explain the purpose of each of the following tests;

    a. MCU run with the CNC machine locked

    b. Dry run

17. (5 points) Explain the method by which the setup person can locate the part origin using machining center.

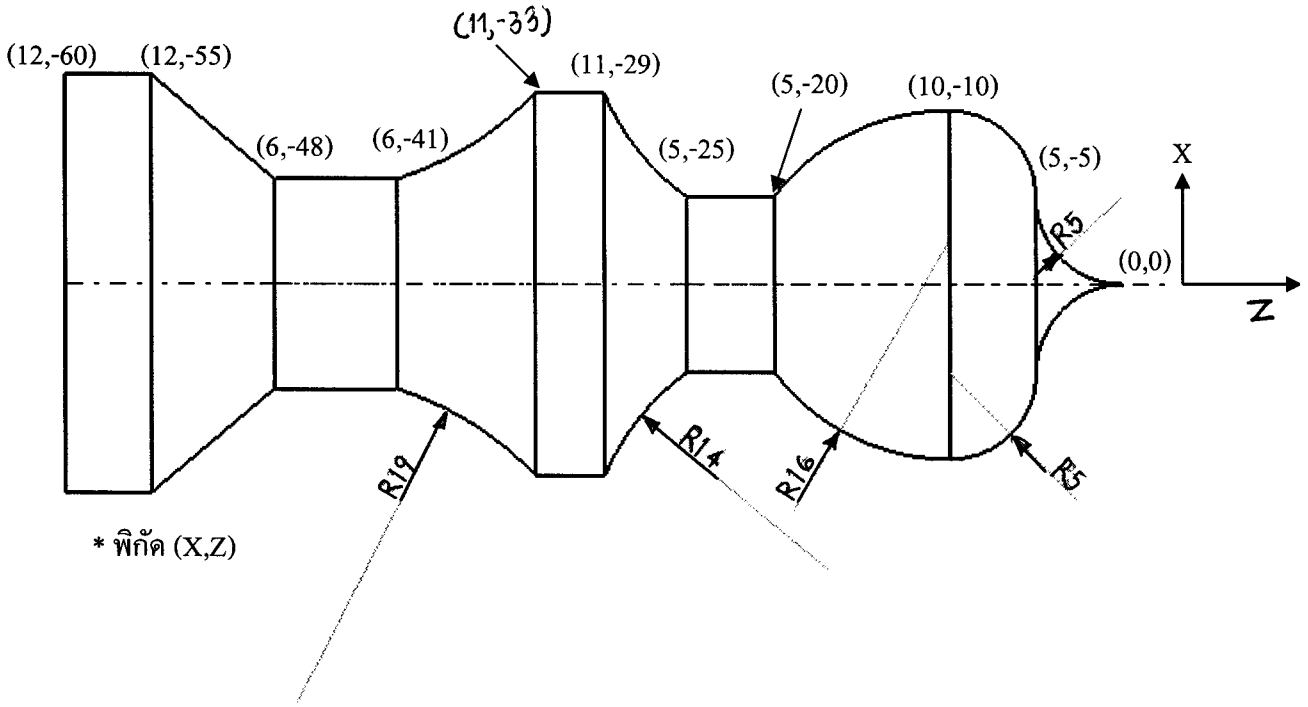
18. (20 points) Complete a CNC program to profile mill and turn the contour given in the figures below.



Student ID .....

Block No.	NC Code	Description
N001	:G90 G94 G71 G17	
N002	T1 M6	
N003	S1000 ____	เปิด Spindle หมุนตามเข็มนาฬิกา
N004	G0 X10 Y5 Z5	
N005	G1 Z0 F200 ____	เปิดน้ำหล่อเย็น
N006	(____ ,"R")	ตั้งโปรแกรมย่อยชื่อ "R"
N007	____ Z-0.5 F150	อ้างอิงแบบสัมพัทธ์ (Increment)
N008	____ G3 X20 Y12 P10	อ้างอิงแบบสัมบูรณ์ (Absolute)
N009	G1 X30 Y45	
N010	____ X12 Y33 P20	เดินมีดเป็นเส้นโค้ง
N011	G3 X30 Y45 P20	
N012	G1 X40 Y45	
N013	G2 _____ P10	พิกัด X,Y
N014	G1 X24 Y25	
N015	G1 X47 Y7	
N016	G3 X52 Y6 P5	
N017	G2 X47 Y7 ____	รัศมีความโค้ง
N018	G1 X24 Y25	
N019	G1 X20 Y12	
N020	G2 X10 Y5 P10	
N021	(____)	จบโปรแกรมย่อย
N022	(CLS, "R", __)	ต้องการความลึก 3 mm.
N023	G0 Z100 M5	
N024	M30	

Student ID .....



Block No.	NC Code	Description
N001	:G90 G71 G63 G95 G97 G40	
N002	T1 M6.1	
N003	S1500 ____	เปิด Spindle หมุนทวนเข็มนาฬิกา
N004	G0 X13 Z5	
N005	____ [START P1]-[END P1] D1 E0.5 I0.5 K0.5 U0.25 W0.25 Q2 F0.2 M8	วัฏจักรการกลึงหยาบ
N006	G0 X13 Z5	
N007	____ [START P1]-[END P1] F0.05	วัฏจักรการกลึงละเอียด
N008	G0 X13 Z5	
N009	M30	
N010	[____ P1]	เริ่มโปรแกรมย่อย P1
N011	G1 X0 Z0	
N012	G2 X5 Z-5 ____	รัศมีส่วนโค้ง
N013	G3 X10 Z-10 P5	
N014	G3 X5 Z-20 ____	รัศมีส่วนโค้ง
N015	G1 X5 Z-25	

N016	G2 X11 Z-29 P14	
N017	G1 _____	พิกัด X,Z
N018	G2 X6 Z-41 ____	รัศมีส่วนโค้ง
N019	G1 X6 Z-48	
N020	G1 _____	พิกัด X,Z
N021	G1 X12 Z-60	
N022	G0 X13	
N023	[____ P1]	จบโปรแกรมย่อย P1