

Name : ..... ID. Code : ..... Years : .....

Prince of Songkla University

Faculty of Engineering

Final Examination Semester 1

Academic Year : 2004

Date : 7 October 2004

Time : 9.00-12.00

Subject : 226-495 Special Topics in Manufacturing V (CAD/CAM Technology) Room :

ทูลจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา โทษสูงสุดให้ออก

**Instruction**

1. There are 5 questions , 100 scores.
2. Attempt to do all questions in this test paper. More blank papers can be requested if needed.
3. Books, notes, a dictionary and a calculator are allowed.
4. Don't write in red pen.

No.	Full Score	Scores
1	20	
2	15	
3	10	
4	40	
5	15	
<b>Total</b>	<b>100</b>	

Mr. Pichet Trakarnchaisiri

Lecturer



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**1. Please write the short explanation for each question about CAPP/CAD/CAM/CAE/CNC.**

**(Select to answer only 5 questions)** (4 scores / 1 question)

1.1 What are the duties of computer aided manufacturing. Please give some example?

1.2 What are the duties of computer aided engineering. Please give some example?

1.3 What are the advantages and disadvantages of using variant process planning system?

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1.4 What are the popular GT classifications and coding systems? Please list at least 3 types and define.

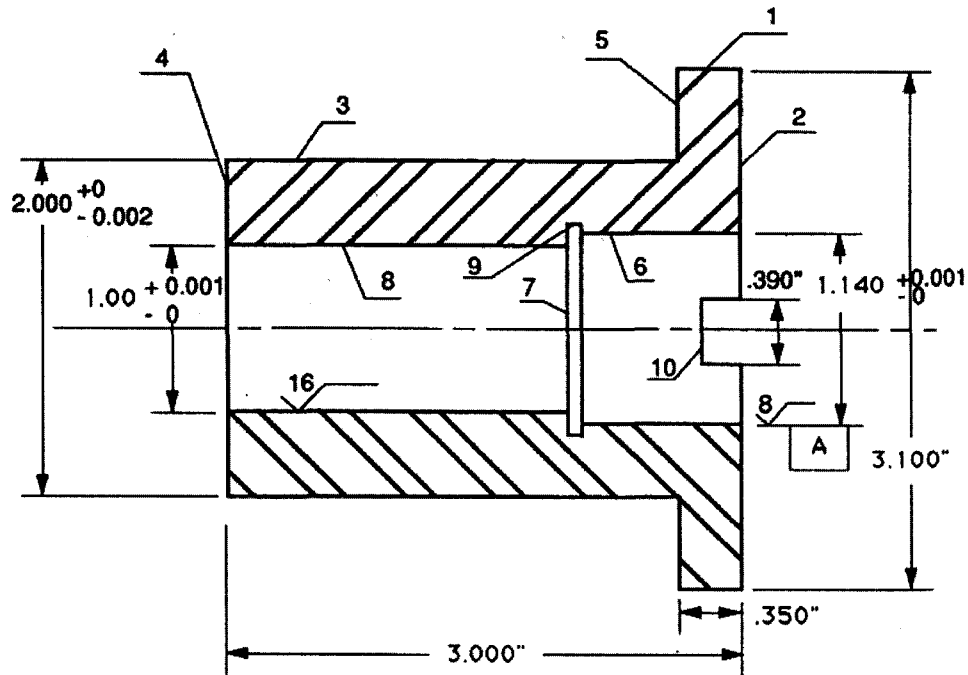
1.5 What is the different duty of linear scale and resolver in feedback interface system of MCU.

1.6 What is the EDM machine? Please describe the principle of cutting by EDM.

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2. The part shown in Figure below is made of AISI 1340 medium carbon steel. (15 scores)



Material: AISI 1340 Medium carbon steel  
Surface roughness unless specified = 63 micro in.

2.1 Code the part using the Opitz and Vuoso Phaha coding systems. (5 scores)

L =  D =  L/D =

Opitz

Vuoso Phaha

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2.2 Please prepare the detailed process plan for the part. List operations , machine tools , tool-shape and tool-material. (10 scores)

Operation	Machine Tool	Tool-shape	Tool-material
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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3. List the step of process when you want to produce a part by using CAD/CAM and CNC machine.

(10 scores)

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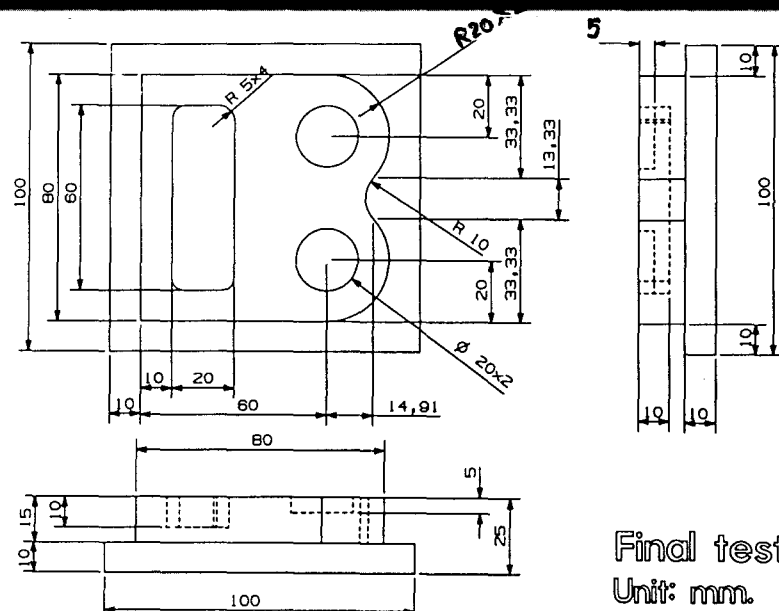
4. Generate a design of the part shown in job description paper on NC program report. The NC program is planned to operate on the CNC machining center, with Cincinnati controller system. Design the operations and calculate the suitable value in each parameter, fill all in the blank of job description paper and NC program report. (Dimension of blank part : 100 X 100 X 25 mm.)

(40 scores)

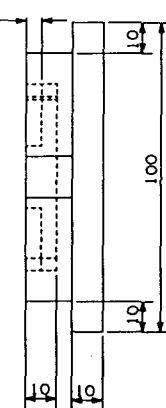
Job description paper		
M/C Name : Machining Center	Material : Stainless steel	Unit : mm.
Job Name : Cavity plate	Job No. : 1	Planner name :

Part figure





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Final test47  
Unit: mm.

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Step of Operation	No. of Cutting Tool Configuration	Spindle Speed (N)	Feed
1. Rough contour milling at outside edge with z step = 2.5 mm. 4 times by tool No.1 (stock 1 mm.)	1. Tool no. 1 HSS End mill M18, 2 flute	_____ rpm	_____ mm./min.
2. Finishing contour milling at outside edge with z step = 15 mm. 1 time by tool No.2	2. Tool no. 2 HSS End mill M16, 4 flute	_____ rpm	_____ mm./min.
3. Spot Drilling at center and 4 center corners of rectangular pocket and 2 holes of circular pocket 2.00 mm. depth by tool No.3	3. Tool no. 3 HSS Center drill M3	500 rpm	120 mm./min.
4. Drill a hole at center and 4 corners of square pocket 10 mm. depth and 2 holes 5 mm depth by tool no.4	4. Tool no. 4 HSS Drill M8	_____ rpm	_____ mm./min.
5. Rough and finishing milling at a rectangular pocket z step = 2.5 mm. 4 times by tool No. 5 & 6 (stock 0.5 mm.)	5. Tool no. 5 HSS End mill M8, 2 flute	_____ rpm Finishing 1200 rpm	_____ mm./min. Finishing 30 mm/min.
6. Rough and finishing circular pocket with z step = 2.5 mm. 2 times by tool No. 5 & 6 (stock 0.5 mm.)	6. Tool no. 6 HSS End mill M8, 4 flute	_____ rpm Finishing 1200 rpm	_____ mm./min. Finishing 50 mm/min.

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NC program report			
Job name : Cavity plate	Job No. :	Drawing No. :	Page : /
Machine : Machining Center	Program Name :	Programmer :	Date :
N 005			
N 010			
N 015			
N 020			
N 025			
N 030			
N 035			
N 040			
N 045			
N 050			
N 055			
N 060			
N 065			
N 070			
N 075			
N 080			
N 085			
N 090			
N 095			
N 100			
N 105			
N 110			
N 115			
N 120			
N 125			
N 130			
N 135			
N 140			
N 145			
N 150			

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Name : ..... ID. Code : ..... Years : .....

<b>NC program report</b>			
Job name : Cavity plate		Job No. :	Drawing No. :
Machine : Machining Center		Program Name :	Page : /
		Programmer :	Date :
N 155			
N 160			
N 165			
N 170			
N 175			
N 180			
N 185			
N 190			
N 195			
N 200			
N 205			
N 210			
N 215			
N 220			
N 225			
N 230			
N 235			
N 240			
N 245			
N 250			
N 255			
N 260			
N 265			
N 270			
N 275			
N 280			
N 285			
N 290			
N 295			
N 300			

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Name : ..... ID. Code : ..... Years : .....

NC program report			
Job name : Cavity plate		Job No. :	Drawing No. :
Machine : Machining Center		Program Name :	Programmer :
			Page : /
			Date :
N 305			
N 310			
N 315			
N 320			
N 325			
N 330			
N 335			
N 340			
N 345			
N 350			
N 355			
N 360			
N 365			
N 370			
N 375			
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N 400			
N 405			
N 410			
N 415			
N 420			
N 425			
N 430			
N 435			
N 440			
N 445			
N 450			

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Name : ..... ID. Code : ..... Years : .....

<b>NC program report</b>			
Job name : Cavity plate		Job No. :	Drawing No. :
Machine : Machining Center		Program Name :	Programmer :
		Date :	
N 455			
N 460			
N 465			
N 470			
N 475			
N 480			
N 485			
N 490			
N 495			
N 500			
N 505			
N 510			
N 515			
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N 560			
N 565			
N 570			
N 575			
N 580			
N 585			
N 590			
N 595			
N 600			

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5. Please write the short answers for each question about industrial robotics. (15 scores)

5.1 Using L = Linear O = Orthogonal R = rotational T = Twisting and V = Revolving , kinematically describe the following basic robot geometries :

(5 scores)

5.1.1 Cartesian \_\_\_\_\_

5.1.2 Cylindrical \_\_\_\_\_

5.1.3 Spherical \_\_\_\_\_

5.1.4 Articulated \_\_\_\_\_

5.1.5 SCARA \_\_\_\_\_

5.2 Draw a picture for comparing elements of arm anatomy between human and robot. (5 scores)

5.3 What are the 3 basic types of drive systems in robot? Give some detail? (5 scores)

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