

Name : ID. Code : Years :

Prince of Songkla University

Faculty of Engineering

Final Examination Semester 1

Academic Year : 2005

Date : 7 October 2005

Time : 9.00- 12.00

Subject : 226-495 Special Topics in Manufacturing V (CAD/CAM Technology) Room : R300

ทูลริตใการสอบ โทษซึ้นต่ำปรับตคใรรายวิชาซึ้น และพัทการเรียน 1 ภาคการศึทษา
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Instruction

1. There are 4 questions , 100 points.
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	Points
1	30	
2	10	
3	20	
4	40	
Total	100	

Assist. Prof. Pichet Trakarnchaisiri

" Do not wait for leaders; do it alone -- person to person." , Mother Teresa



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1. Please write the explanation for each question about CAPP/CNC/FMS/EDM.

(5 points / 1 question)

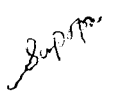
- 1.1 What are the concept of Variant CAPP and Generative CAPP. Please give some advantages and disadvantages between them?

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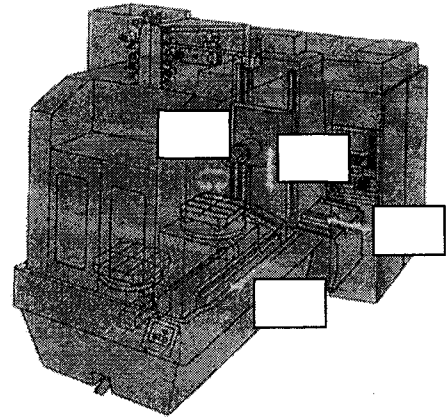
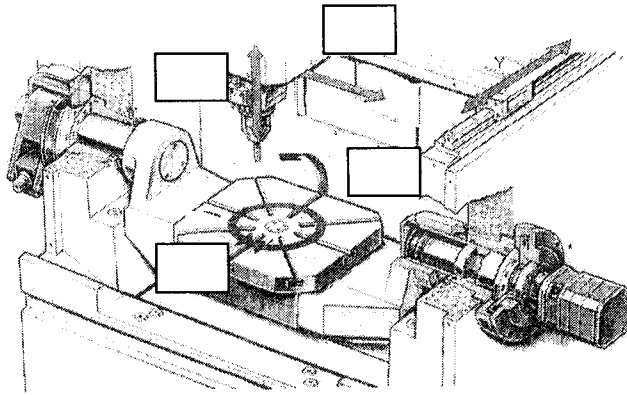
1.2 What are the knowledge-based process planning system, knowledge representation and inference mechanism?

1.3 Draw a servo drive control diagram and explain how to operate servo drive control in a CNC system.



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1.4 Please define the axis of CNC machine on figures below and give some advantages and disadvantages between a vertical machining center and a horizontal machining center.



Signature

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1.5 What is the Electrical discharge method (EDM)? Please describe the principle and benefits of cutting by EDM.

1.6 How do you set the relation factors with electrode erosion when you want to produce finishing surface on cavity plate of injection mold by a electrical discharge machine?

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2. Show the setup required for inspecting the part in figure 1. A part being inspected has the dimension , inch unit , shown in figure 2. Please answer the questions. (10 points)

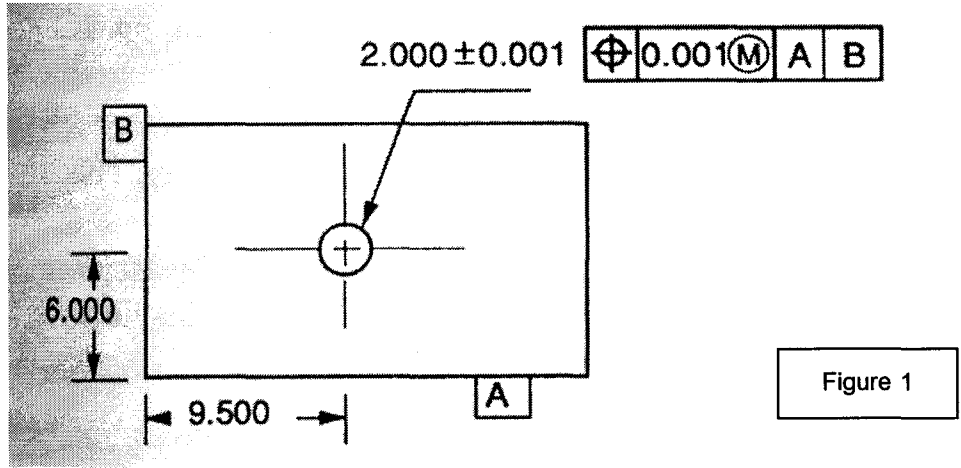


Figure 1

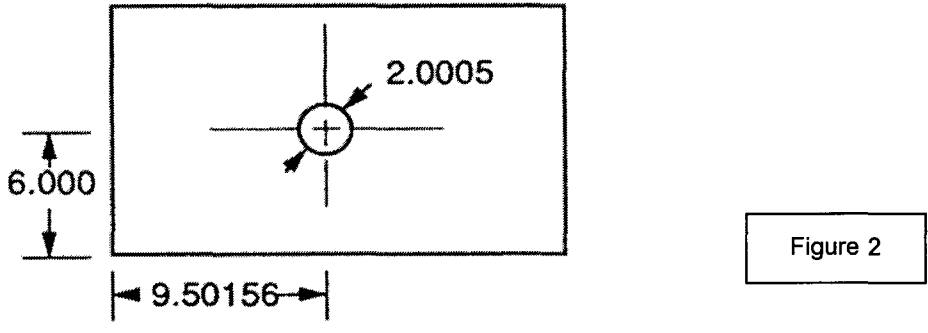


Figure 2

- 2.1 Describe the meaning of geometric tolerancing symbol in figure 1. (2 points)

- 2.2 Is a part in figure 2 acceptable? Why? (2 points)

- 2.3 Write the geometric tolerancing symbol of symmetry tolerance of part side A 2000 μin.
(Define it on part drawing) (2 points)
- 2.4 Write the geometric tolerancing symbol of parallelism tolerance of part side B 1500 μin.
(Define it on part drawing) (2 points)
- 2.5 Write the geometric tolerancing symbol of perpendicular tolerance of part side A 1000 μin.
(Define it on part drawing) (2 points)

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3. Please write the short answers for each question about industrial robots. (20 points)

3.1 Sketch and state the principle configurations and working envelop of these robots.

Give typical applications. Select only 3 types from 5 robots. (15 points)

- i. Cartesian coordinate
- ii. Polar coordinate
- iii. Cylindrical coordinate
- iv. Articulated
- v. SCARA

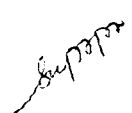
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- 3.2 List the types of robot drive mechanism and explain the advantages or disadvantages of each type.
(5 points)

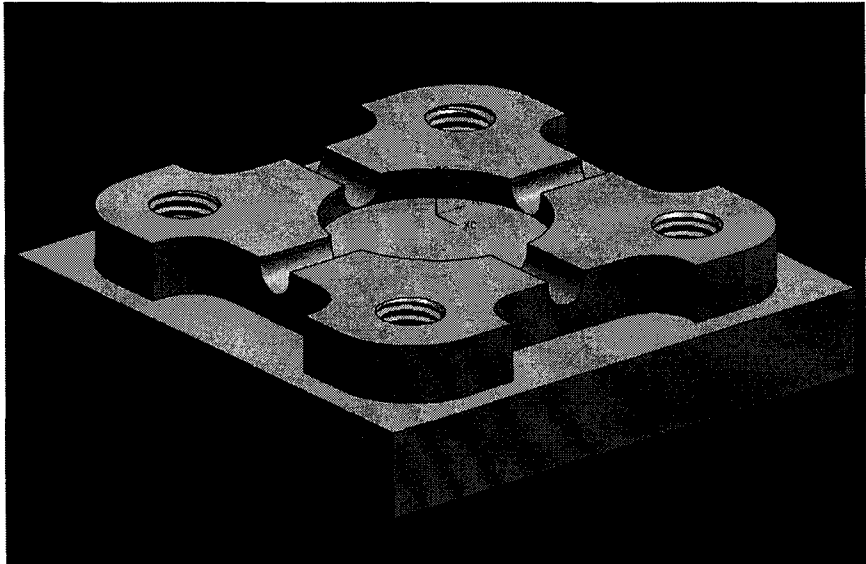
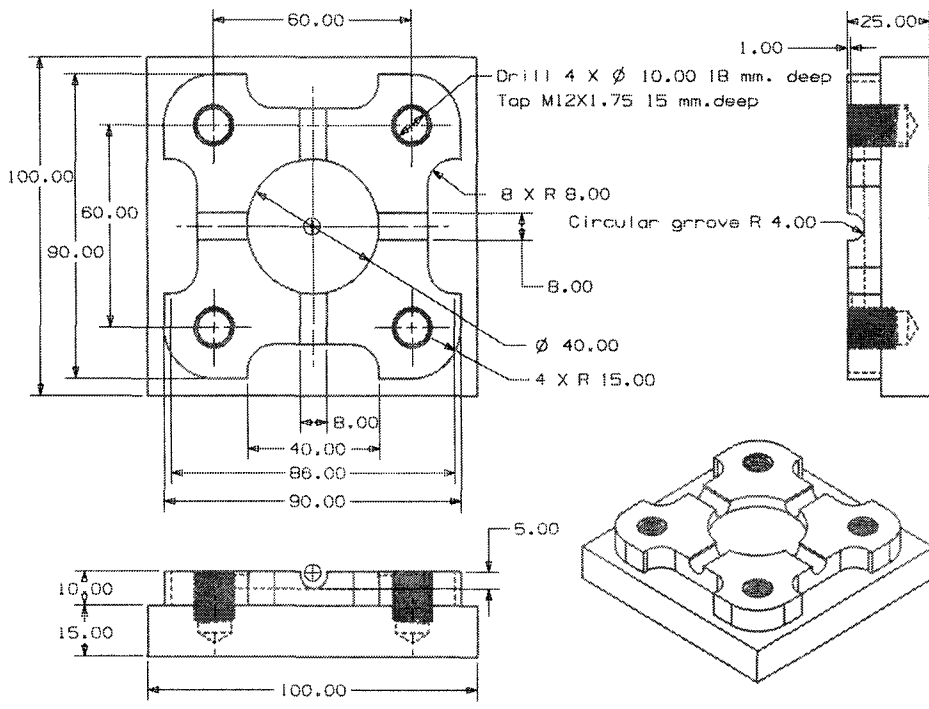


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4. Generate a design of the part shown in job description paper on NC program report. The NC program is planned to operate on the CNC machining center, with Cincinnati controller system. Design the operations and calculate the suitable value in each 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 points)

Job description paper		
M/C Name : Machining Center	Material : Tool steel (Alloy)	Unit : mm.
Job Name : Core insert	Job No. : 1	Planner name :

Part figure

Sanjaya

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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 M16, 2 flute	_____ rpm	_____ mm./min.
2. Finishing contour milling at outside edge with z step = 10 mm. 1 time by tool No.2	2. Tool no. 2 HSS End mill M12, 4 flute	_____ rpm	_____ mm./min.
3. Spot Drilling at center circular pocket and 4 holes around circular pocket 2.00 mm deep by tool No.3	3. Tool no. 3 HSS Center drill M3	1000 rpm	130 mm./min.
4. Drill a hole at center circular pocket 5 mm deep and 4 holes around circular pocket 18 mm deep by tool no.4	4. Tool no. 4 HSS Drill M10	_____ rpm	_____ mm./min.
5. Rough and finishing milling at a circular pocket z step = 2.5 mm. 2 times by tool No. 5 & 6 (stock 0.5 mm.)	5. Tool no. 5 HSS End mill M8, 2 flute 6. Tool no. 6 HSS End mill M8, 4 flute	_____ rpm Finishing 1200 rpm	_____ mm./min. Finishing 30 mm/min.
6. Tap inside screw at 4 holes around circular pocket 15 mm deep by tool no.7	7. Tool no. 7 HSS Rigid Tap M12 X 1.75	200 rpm	_____ mm./rev.
7. Mill 4 circular groove paths 5 mm deep by tool no.8	8. Tool no. 8 Carbide Ball mill M8, 2 flute	_____ rpm	123 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 :

NC program report			
Job name : Cavity plate	Job No. :	Drawing No. :	Page : /
Machine : Machining Center	Program Name :	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			

Name : ID. Code : Years :

NC program report			
Job name : Cavity plate	Job No. :	Drawing No. :	Page : /
Machine : Machining Center	Program Name :	Programmer :	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			
N 380			
N 385			
N 390			
N 395			
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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N 485			
N 490			
N 495			
N 500			
N 505			
N 510			
N 515			
N 520			

Name : ID. Code : Years :

NC program report			
Job name : Cavity plate		Job No. :	Drawing No. : Page : /
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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