

Name : ID. Code : Years :

Prince of Songkla University

Faculty of Engineering

Final Examination Semester 2

Academic Year : 2005

Date : 5 March 2006

Time : 9:00- 12:00

Subject : 226-332 Basic CAD/CAM

Room : หัวหุ่น

ทูลจรดในการสอบ โทษซ้ันต่ำปรบดทในรายวชาน้ัน และพ้กการเรยีน 1 ภาคการศ้กษา

Instruction

1. There are 5 questions , 125 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 with red pen.

No.	Full Score	Points
1	30	
2	10	
3	10	
4	25	
5	50	
Total	125	

Asst. Prof. Pichet Trakarnchaisiri



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1. Please write the explanation for each question about CAM and CNC. (30 points)

1.1 Explain the outstanding points of distributed numerical control. (5 points)

1.2 What are the differences between open-loop control and close-loop control? (5 points)

1.3 List the coordinate references in CNC system? (5 points)



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1.4 What is a canned cycle? (5 points)

1.5 What is the different function of linear scale and resolver in feed back interface system of MCU?
(5 points)

1.6 What are the functions of computer aided manufacturing. Please give some example? (5 points)



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2. Please write the explanation for each question about EDM. (10 points)

2.1 What is the Electrical Discharge Machine (EDM)? Please describe the principle of Electrical Discharge Method and benefits of cutting by EDM. (5 points)

2.2 From the relation factors of electrode-workpiece erosion, How to produce rough surfaces on a cavity plate of injection mold by an Electrical Discharge Machine? (5 points)



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- 3. List the main steps of process when produce a part by using CAD/CAM and CNC machine.
(10 points)



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4. Please write the short answers for each question about industrial robots. (30 points)

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

Give typical applications. Select only 3 types from 5 robots. (21 points)

- 4.1.1 Cartesian coordinate
- 4.1.2 Polar coordinate
- 4.1.3 Cylindrical coordinate
- 4.1.4 Articulated
- 4.1.5 SCARA



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3.2 List at least 4 types of robot drive mechanism and explain the advantages or disadvantages of each type. (4 points)

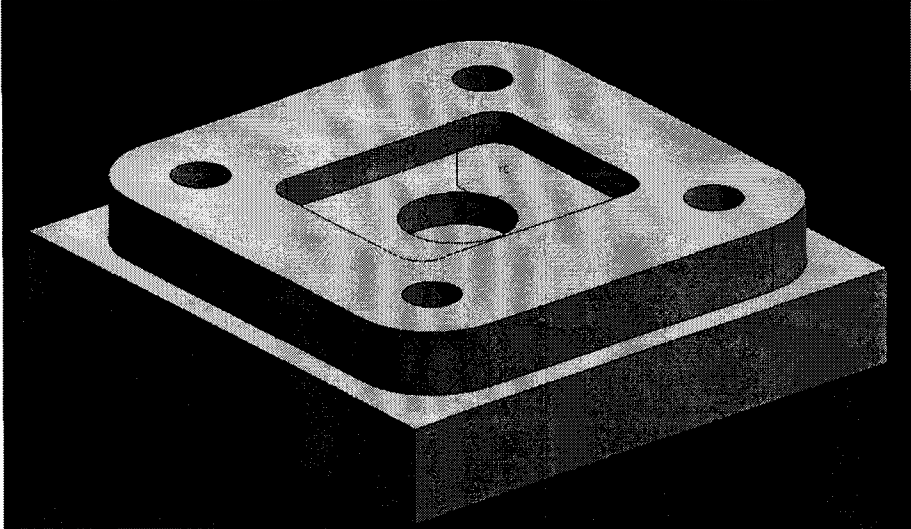
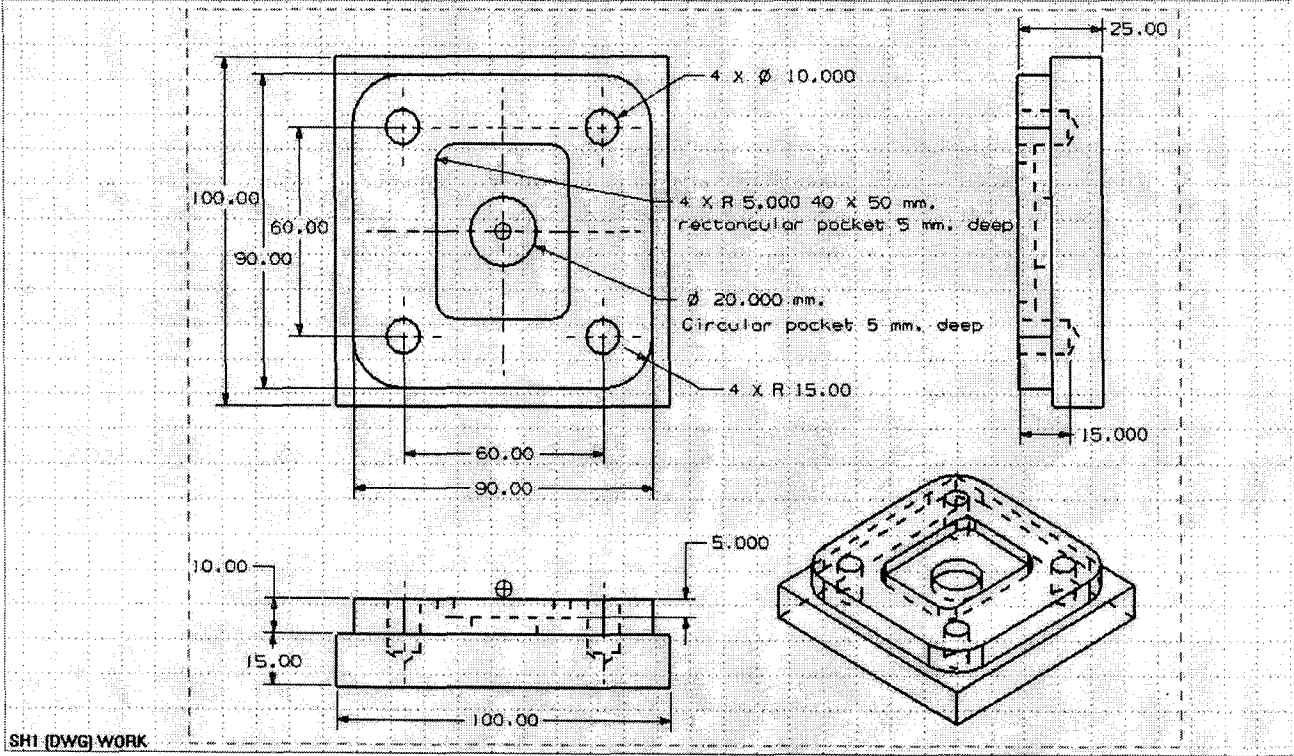


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5. Generate a design of the part shown in job description paper on NC program report. The NC program is planned to operate on the CNC machining center, with Cincinnati controller system. Design the operations and calculate the suitable value in each parameter, fill all in the blank of job description paper and NC program report. (Dimension of blank part : 100 X 100 X 25 mm.) (50 points)

Job description paper		
M/C Name : Machining Center	Material : Medium carbon steel	Unit : mm.
Job Name : Core Mill	Job No. : 1	Planner name :

Part figure

Technical drawing details:

- Top View: Overall dimensions 100.00 x 100.00 mm. Inner dimensions 60.00 x 60.00 mm. Features include 4 x ϕ 10.000 holes, a central ϕ 20.000 mm circular pocket (5 mm deep), and a 4 x R 5.000 40 x 50 mm rectangular pocket (5 mm deep). Corner radii are 4 x R 15.00.
- Side View: Shows a total thickness of 25.00 mm and a 15.00 mm wide section.
- Bottom View: Shows a 10.00 mm wide section and a 5.000 mm wide section.
- Isometric View: Shows the 3D perspective of the part.

SHI (DWG) WORK

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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 = 2.0 mm. 5 times by tool No.1 (stock 0.5 mm.)	1. Tool No. 1 HSS End mill M14, 2 flutes	_____ 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 flutes	_____ rpm	_____ mm./min.
3. Spot Drilling at the center pocket and 4 holes around 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 the center of pocket 8 mm deep and 4 holes around circular pocket 15 mm deep by tool No.4	4. Tool No. 4 HSS Drill M10	_____ rpm	_____ mm./min.
5. Rough milling at a rectangular pocket z step = 2.5 mm. 2 times by tool No. 5 (Wall stock 0.25 mm., Floor stock 0mm.)	5. Tool No. 5 HSS End mill M8, 2 flutes	_____ rpm	_____ mm./min.
6. Rough milling at a circular pocket z step = 2.5 mm. 2 times by tool No. 5 (Wall stock 0.25 mm., Floor stock 0mm.)	6. Tool No. 6 HSS End mill M8, 4 flutes	Finishing 1230 rpm	Finishing 32 mm./min.
7. Finishing contour milling at a rectangular pocket z = 5.0 deep by tool No. 6 (Wall stock 0.0 mm.)	7. Tool No. 7 HSS End mill M6, 4 flutes	Finishing _____ rpm	Finishing _____ mm./min.
8. Finishing contour milling at a circular z = 5.0 deep by tool No. 7 (Wall stock 0.0 mm.)			

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NC program report			
Job name : Core Mill	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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NC program report			
Job name : Core Mill		Job No. :	Drawing No. :
Machine : Machining Center		Program Name :	Programmer :
		Page : /	
		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			
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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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NC program report			
Job name : Core Mill	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			
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N 395			
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N 405			
N 410			
N 415			
N 420			
N 425			
N 430			
N 435			
N 440			
N 445			
N 450			

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NC program report			
Job name : Core Mill	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			
N 520			
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