

**PRINCE OF SONGKLA UNIVERSITY**  
**FACULTY OF ENGINEERING**

Final Examination: Semester 2  
Date: February 29, 2008  
Subject: 226-332: Basic CAD/CAM

Academic Year: 2007  
Time: 9:00-12:00  
Room: A401

ทฤษฎีในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทฤษฎี และพักการเรียน 1 ภาคการศึกษา

**Instructions**

- This exam paper comprises **PART A** and **PART B**, all are in 8 pages.
- For **PART A**, attempt all 4 questions and write the answer in this exam paper.
- For **PART B**, Write your answers in the answer-book separately provided.
- It is a **closed-book** exam, only a dictionary (**not** a talking dictionary) and a calculator without programming capability are allowed.
- Each question carries different points as specified accordingly. The total score is 60.

Name: .....	Student ID.....
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**PART: A**

Question #	Full Score	Assigned Score
1	10	
2	10	
3	5	
4	5	
<b>Total</b>	<b>30</b>	

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**PART: B**

Question #	Full Score	Assigned Score
5	3	
6	5	
7	5	
8	5	
9	12	
<b>Total</b>	<b>30</b>	

Assoc. Prof. Somchai Chuchom



Part A

**Question #1.** Discuss the difference between a variant and a generative process planning. (10 points)



**Question #2.** From the Computer Aided Process Planning presentation in the classroom, give one application for each type of CAPP. Explain their concept and implementation. (10 points)

**Question #3.** List the main components of a Computer Numerical Control Machine. (5 points)



**Question #4.** Industrial robots are used in many applications because of their flexibilities. How can you apply an industrial robot in the spray painting? (5 points)



**Part B**

Write your answers in the answer-book separately provided.

**Question #5.** Explain the two types of the tool changing system for MC. (3 points)

**Question #6.** In order to set up a machining center properly and safely, what are at least 4 tasks (or factors) an operator must understand? Explain. (5 points)

**Question #7.** Explain the root-problems in today's manufacturing, How can e-Manufacturing overcome the problems? (5 points)

**Question #8.** Compare STEP to IGES. (5 points)

**Question #9.** Create the tool data table as needed, develop a process plan (use Figure 9-1) and then write the program to execute the profile milling, the hole operations and the slot for the part drawing shown in Figure 9-2. The part has been previously squared and milled to the proper thickness. Use absolute programming, cutter compensation, and canned cycles where appropriate. The standard G-code, M-code are also provided in Figure 9-3 and 9-4, respectively. (12 points)

IE-PSU Process Plan				Part No. _
Operation	Tool #	Tool Description	RPM	Feedrate

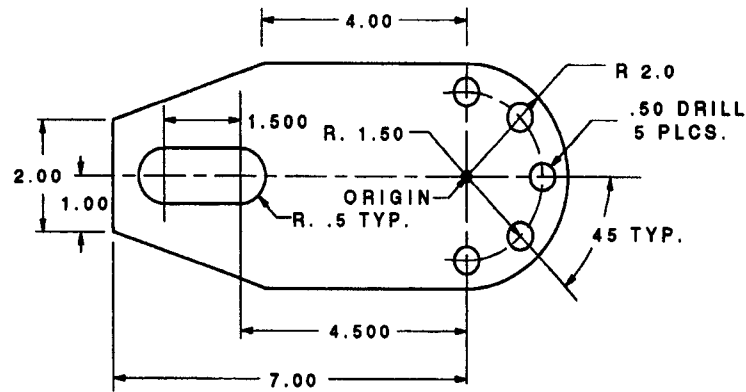
**Figure 9-1** A Process Plan Sheet



G92	Workpiece coordinate preset	
G98	Canned cycle initial point return	Modal
G99	Canned cycle R point return	Modal

**Figure 9-3** Common machining center G-codes.





Operations:

1. Mill Profile .50 Deep
2. Mill Slot .500 Deep
3. Drill .50 Holes .500 Deep

Figure 9-2 Part Drawing

G00	Rapid traverse	Modal
G01	Linear positioning at a feedrate	Modal
G02	Circular interpolation clockwise	Modal
G03	Circular interpolation counterclockwise	Modal
G28	Zero or home return	Nonmodal
G40	Tool diameter compensation cancel	Modal
G41	Tool diameter compensation left	Modal
G42	Tool diameter compensation right	Modal
G43	Tool height offset	Modal
G49	Tool height offset cancel	Modal
G54	Workpiece coordinate preset	
G70	Inch programming	Modal
G80	Canned cycle cancel	Modal
G81	Canned cycle drill	Modal
G83	Canned peck cycle drill	Modal
G84	Canned tapping cycle	Modal
G85	Canned boring cycle	Modal
G90	Absolute coordinate positioning	Modal
G91	Incremental positioning	Modal
G92	Workpiece coordinate preset	
G98	Canned cycle initial point return	Modal
G99	Canned cycle R point return	Modal

Figure 9-3 Common machining center G-codes.

M00	Program stop	Nonmodal
M01	Optional stop	Nonmodal
M02	End of program	Nonmodal
M03	Spindle start clockwise	Modal
M04	Spindle start counterclockwise	Modal
M05	Spindle stop	Modal
M06	Tool change	Nonmodal
M07	Mist coolant on	Modal
M08	Flood coolant on	Modal
M09	Coolant off	Modal
M30	End of program & reset to the top	Nonmodal
M40	Spindle low range	Modal
M41	Spindle high range	Modal
M98	Subprogram call	Modal
M99	End subprogram & return to main program	Modal

**Figure 9-4** *Miscellaneous functions.*