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PRINCE OF SONGKLA UNIVERSITY FACULTY OF ENGINEERING

Final Examination: Semester I Academic Year: 2007

Date: October 1, 2007 Time: 9:00 – 12:00

Subject: 226-341 Maintenance Engineering Room: A400

Instructions

- Write your name and student ID on the exam paper.

- Write your answer in this exam paper, show your work clearly and legibly.

- This is an opened-book examination.

- There are 9 problems and total score is 115.

- Carefully read the problems and answer all questions in each problem.

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Problem (Full score)	Score
1 (20)	
2 (10)	
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8 (10)	
9 (20)	
Total (115)	

Do your best and good luck

Thanate Ratanawilai

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- A special purpose machine is operated to produce a product A 6 days per week, three shifts per day, and 5 hours per shift. The average actual output to produce product A is 2496 parts per week. An OEE of this CNC machine is measured whereas the following is a list of losses encountered during the machining process:
 - Tapping head has to be replaced once every 6 weeks. The replacement takes
 10 hours each time.
 - The circle saw blade has to be replaced twice a week and takes 50 minutes.
 - The drilling head breaks once every day so that 35 parts have to be reworked and it takes one hour to replace the drill.
 - The bar feeder does not work properly so the part is cut too short. This
 causes a minor stoppage that happens 5 times per day and takes 10 minutes
 to clear and 3 parts are lost.
 - 1.1 Calculate the overall effectiveness of this machine. (10 marks)
 - 1.2 If the drilling head breakdown was changed from one hour to one and half hour, will it affect the OEE? Explain. (5 marks)

1.3	Is it possible to have the OEE more than 100%? Why. (5 marks)

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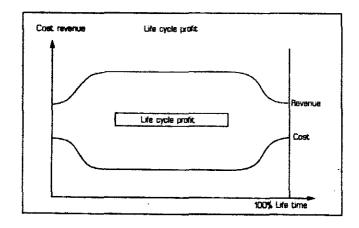
2.	Let say that that the maintenance class is one of the production lines in the
	university. What are the six big losses of this production line? Give the reason. (10
	marks)
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3.	
	Machine neck (3 marks)
	Man neck (3 marks)
	••••••••••••••••••••••••

	Fish bone diagram, how is it important to maintenance system? (3 marks)
	PDCA cycle, how is it important to maintenance system? (3 marks)
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Human five senses, how is it important to maintenance system	n? (3 marks)

- 4. Is it correct to say that "cleaning" is an inspection"? Why, give an example? (5 marks)
- 5. Describes "the life cycle profit" as shown in the figure below. (5 marks)

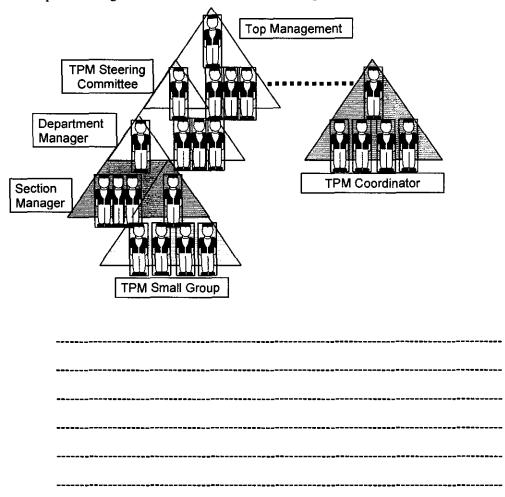


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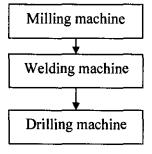
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	0. ((a) What is "clean production" and how to start in the production line? (5 marks)
		(b) What is the relation between the clean production and maintenance system? (5
		marks)
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	7.	If you are a member of the team to establish TPM system for the Industrial
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		Engineering Department, Prince of Songkla University. How could you apply TPM 8 pillars to start until complete this TPM project? Explain each step in details. All
		Engineering Department, Prince of Songkla University. How could you apply TPN 8 pillars to start until complete this TPM project? Explain each step in details. All data can be assumed if necessary. (20 marks)
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8. Explain the organization chart below. How is it important? (10 marks)



Three main operations shown in the figure below are utilized for making a small part of a motorcycle.



Construct the preventive maintenance in the given tables by selecting 2 out of the 3 machines above and choosing 3 parts from each selected machine. (20 marks)

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Machine / Equipment Analysis

Machine /	Machine charaterization and how to	Priority	working continuously /	Work condition	Main part
Equipment list	operate		automatically / periodically	1. time to operate	
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	0	: Lubrication - Replacement	0	: Replacement
(3)	0	: Inspection	(6) O	: Overhaul
		: Functional Check		

	Machine/Equipment		MTBF-F	requency		Last Maintenance	Next Maintenance
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	(2)	△ L: Lubrication - Top up	(5) Repair
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Planning and Record		O: Inspection	(6) O : Overhaul
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