PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester II   Academic Year: 2015

Date: April 29, 2016   Time: 13:30-16:30.

Subject: 225-503 Production Systems & Management   Room: R201

Instructions

- There are 4 questions in 4 pages (include this cover page)
- Answer all 4 questions in the **answer**-book provided
- <u>Open-book exam.</u> All materials, books, papers, calculators and dictionaries are allowed.
- Total score is 60

Questions	Full Score	Assigned Score
Q1	15	
Q2	15	
Q3	15	
Q4	15	
Total	**60**	

Assoc. Prof. Somchai Chuchom

Question 1 (15 marks)

According to the production of the product you have proposed as a case study during the course, explain in details on the preparation of information, documentation, and other resources in order to manage this operation and control the production line. Specify the tools and/or technologies applied in the management. (You can assume any specific information if needed)

Question 2 (15 marks)

Use the given terms or phrases below to explain the concepts of the TPS (Toyota Production System) and show in details the implementation of TPS in any production line you have ever experienced.

a) Autonomation	b) Andon
c) Production smoothing	d) Pull system
e) Visual control	f) Creative thinking
g) Kanban	h) Pokayoke
i) Continuous flow of production	j) Just in time
k) Standardization of operations	l) Improvement activities
m) Flexible work-force	n) Quality control circles
o) Function management	p) Reduction of setup time
q) Machine layout and multi-function worker	

Question 3 (15 marks)

Choose **only one** topic from the list below and explain in details on the selected topic to show that it is a useful tool for decision making in management system for manufacturing, and discuss on the reviewed papers or related work if possible. The lists of topics are:

3-1) Production Scheduling (PERT/CPM)

3-2) Inventory Management

3-3) Production Planning (LP, Forecasting)

3-4) Production Control (TPM)

Question 4 (15 marks)

Using the information on the LP problem below to answer the following questions;

4.1 If the time and the resources were available up to 10 units each, how do they affect the value of Z and the optimal solotions?

4.2 How can you make use of the results below to help production management?

The LP problem was defined and solved by Simplex Method as below;

Objective Function : Max $Z = 5x_1 + 2x_2 + 3x_3 - x_4 + x_5$

Subject to :

$$x_1 + 2x_2 + 2x_3 + x_4 = 8 \quad \longrightarrow \quad \text{1) Time Constraint}$$

$$3x_1 + 4x_2 + x_3 + x_5 = 7 \quad \longrightarrow \quad \text{2) Resources}$$

$$x_1, x_2, x_3, x_4, x_5 \geq 0 \quad \longrightarrow \quad \text{3)}$$

The answer, and the sensitivity reports were shown below

Solver Options
Max Time Unlimited, Iterations Unlimited, Precision 0.000001
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNega

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$H$17	Max. Profit ($US)	0	16.2

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$C$6	x1	0	1.2	Contin
$D$6	x2	0	0	Contin
$E$6	x3	0	3.4	Contin
$F$6	x4	0	0	Contin
$G$6	x5	0	0	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$H$10	2.2 Resources	7	$H$10<=$I$10	Binding	0
$H$9	2.1 Time	8	$H$9<=$I$9	Binding	0

Microsoft Excel 15.0 Sensitivity Report
Worksheet: [Example-1.xlsx]Sheet2
Report Created: 28/4/2559 11:28:14

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$C$6	x1	1.2	0	5	4	1
$D$6	x2	0	-5.2	2	5.2	1E+30
$E$6	x3	3.4	0	3	2	1.333333333
$F$6	x4	0	-1.8	-1	1.8	1E+30
$G$6	x5	0	-0.4	1	0.4	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$H$10	2.2 Resources	7	1.4	7	17	3
$H$9	2.1 Time	8	0.8	8	6	5.666666667