

※考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Questions [30%]

Please answer the following questions and justify your answer.

- [15%]** Pull and Kanban System: (a) Draw a diagram with two production centers and describe the mechanics of Kanban. (b) Describe the concept of single minute exchange of dies (SMED). (c) Give a table to describe the advantages and disadvantages of the Just-in-Time (JIT) philosophy.
- [15%]** Quality and Assurance: (a) Show a comparison between statistical quality control (SPC) and quality engineering (or termed Taguchi method). (b) Describe the components and problem-solving methods in the quality control circle (QCC). (c) Give a table to describe the advantages and disadvantages of the 100% inspection and sampling inspection.

Numerical Problem and Analysis [70%]

Please answer the following numerical questions and show all your work in detail.

3. [19%] Forecasting Problem

NCKU gift shop sells mug cup to alumni. Suppose that the demand history of mug cup for the past ten months is given as following table.

Month	Demand (100 units)	Month	Demand (100 units)
1	20	6	28
2	25	7	30
3	17	8	19
4	18	9	26
5	22	10	37

- [7%]** Determine the one-step-ahead forecasts for period 4 through 10 using 3-period moving-average forecast.
- [7%]** Determine the one-step-ahead forecasts for period 2 through 10 using exponential smoothing. Let us assume that the forecast for period 1 was 20 (unit: 100). Suppose that a smoothing constant alpha is equal to 0.2, which determines the relative weight placed on the current observation of demand.
- [5%]** Give a comparison of moving averages and exponential smoothing.

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4. [14%] Assignment Problem

Consider the NCKU, one professor would like to assign 4 tasks to his/her 4 graduate students (i.e., assignees). The "cost" table is shown as follows for an assignment problem.

		Task			
		1	2	3	4
Assignee	A	11	17	13	15
	B	19	11	15	17
	C	11	19	17	9
	D	13	7	11	19

- (a) [7%] Manually apply the Hungarian algorithm to solve the assignment problem and show the optimal solutions with minimal total cost.
- (b) [7%] Formulate the assignment problem as a linear programming (LP) model by introducing the appropriate notations and decision variables.

5. [24%] Line Balancing Problem

The NCKU factory would like to build a new production line. The industrial engineering (IE) department plans for the line balancing problem. The processing time and predecessor relationships are given in the following table.

Task	Time Required	Immediate Predecessors
a	1.1	-
b	0.7	a
c	1.7	a
d	0.5	b
e	0.3	b
f	1.3	c
g	0.9	d, e, f
h	1.1	g

- (a) [5%] Draw the precedence diagram.
- (b) [7%] Given the production cycle time is 2.1, solve the problem using Kibridge and Wester (KW) Method.
- (c) [7%] Given the production cycle time is 2.1, solve the problem using Ranked Positional Weights Method.
- (d) [5%] Calculate the Balance Delay of (b) and (c), respectively.

編號：202

國立成功大學 106 學年度碩士班招生考試試題

系所組別：製造資訊與系統研究所

考試科目：生產管理

考試日期：0213，節次：2

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6. [13%] Inventory Problem

NCKU mobile shop sells one specific anniversary version of NCKU mobile. The lead time of procurement is two weeks. The mobile shop maintain a service level 95% (z value is 1.645 for one-side standard normal distribution). The holding cost of one unit is NTD\$2 per week and the ordering cost is NTD\$900. The average of the historical demand is 100 per week with standard deviation 30. If the mobile shop use lot size-reorder point system (i.e., continuous-review policy).

- (a) [5%] Calculate the "Reorder Point".
- (b) [5%] Calculate the "Order-Up-to-Level" (i.e., upper bound of inventory level).
- (c) [3%] Calculate the average inventory level.