朝陽科技大學 97 學年度碩士班招生考試試題

系（所）別：工業工程與管理系　　**總分: 100 分**
組　　別：一般生
科　　目：生產管理　　

1. B&Q computer retailer store has experienced the following monthly sales for one of its popular desktop computers for the past 7 months: **[15%]**

Month	1	2	3	4	5	6	7
Sales	86	75	72	83	132	65	110

Suppose B&Q uses Moving Average N=4 as the forecasting method for monthly sales of this particular desktop computer; determine:

(a) one-step-ahead forecast made for month 7 using MA(4) (i.e. to find F_7) *[5%]*

(b) three-step-ahead forecast made for month 8 using MA(4) (i.e. to find $F_{5,8}$). *[5%]*

(c) At the end of month 4, suppose B&Q store decided to use Exponential Smoothing α=0.2 and use the average sales for the past 4 months as the initial value of the forecast for month 5 (i.e. F_5). Determine the one-step-ahead forecast made for month 6 (i.e. to find F_6). *[5%]*

2. Please determine the appropriate forecasting method(s) to be used for the following historical quarterly sales data: **[5%]**

Quarters	1	2	3	4	5	6	7	8	9	10	11	12
Sales	86	60	38	71	94	66	43	78	103	74	49	87

What forecasting method(s) can be used for the above series? Give reasons? (勿需計算)

3. A downtown special coffeehouse sells Columbian coffee at a fairly steady rate of 600 pounds annually. The beans are purchased from a local supplier for $4.00 per pound. The coffeehouse estimates that it costs $64 in paperwork and labor to place an order for the coffee, and holding costs are based on a 12% annual interest rate. Determine the optimal order quantity that minimizes overall costs for this Columbian coffee. **[8%]**

4. The time-phased net requirements for the base assembly in a table lamp over the next 5 weeks are:

Week	1	2	3	4	5
Requirements	160	220	240	160	200

Determine the (1) lot sizes and (2) total costs using the Silver-Meal heuristic. **[10%]**

5. The Johnson & Kenny Inc. would like to develop an aggregate production plan and to know how many workers will be needed each month for the next six-month period. The following is a monthly demand forecasts for the six-month period. [14%]

Month	Forecasted Demands
Jan.	2040
Feb.	1600
Mar.	1750
April	2580
May	1500
June	1440

The inventory on hand right now (at the end of December) is 660 units. The company wants to maintain a minimum inventory of 120 units each month and would like to have 380 units on hand at the end of June.

Each units requires 4 employee-hours to produce, there are 20 working days each month, and each employee works an 8-hour day. The number of workers right now is 40. Assuming that the cost of hiring a new worker is $250, the cost of firing a worker is $500, and cost of on-hand inventory is $8 per item per month.

Determine (a) the net demand (i.e. the actual required production quantity) for next six-month and (b) number of aggregate units produced per worker per month (i.e. the K value). *[4%+4%=8%]*
Determine (c) "stable workforce production plan" and compute its total costs. *[6%]*

6. Six jobs are to be processed through a single machine. The processing times and due dates are given below. Determine the sequence of jobs in order to minimize the mean waiting time.
(僅需回答:工作之排序即可) [8%]

Job	1	2	3	4	5	6
Processing time	5	9	6	3	12	8
Due date	12	26	24	30	21	17

7. Statistical monitoring of a quality characteristic uses both an $\overline{X}$ and an S chart. The charts are to be based on the stand values: mean $\mu = 200$ and standard deviation $\sigma = 10$ with sample size $n = 4$. Find three-sigma control limits for the S chart. Find a center line and control limits for the $\overline{X}$ chart such that the probability of type I error is 0.05. [Note: Factors for constructing variable control charts when n=4: $c_4 = 0.9213$; $d_2 = 2.059$; $B_3 = 0$; $B_4 = 2.266$; $B_5 = 0$; $B_6 = 2.088$] [$Z_{0.025} = 1.96$]. [10%]

8. What are the differences among the specification limits, natural tolerance limits, and control limits? Please describe them and make comparisons. [10%]

9. A control chart for nonconformities is to be established in conjunction with final inspection of a radio. The inspection unit is to be a group of ten radios. The average number of nonconformities per radio has, in the past, been 0.5. Find three-sigma control limits for a c-chart based on this size inspection unit. [10%]

10. What is the product-quantity chart in facilities planning? What is the purpose of analyzing the product-quantity chart? [10%]