

編號: 290 系所: 製造工程研究所乙組

科目: 生產管理

本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

1. (24%) Given the notation below, answer the following questions.

D = demand rate (in units per year)

c = unit production cost, not counting setup or inventory costs (dollars per unit)

A : fixed or setup cost to place an order (dollars)

h : holding cost (dollars per year)

- (i) Solve the basic economic order quantity (EOQ) and the total costs. You need to show the assumptions, the inventory versus time chart, the cost chart, and the detailed steps to get full credit.
- (ii) Prove that holding and setup costs are fairly insensitive to lot size. Hint: you may perturb the EOQ to see the changes of the final costs.
- (iii) Let p be the uniform supply rate and d be the uniform usage rate. Solve the EOQ and the total costs. You need to show the assumptions, the inventory versus time chart, the cost chart, and the detailed steps to get full credit.
2. (14%) Given the data below, $pj1$ and $pj2$ represent the process time of job j on machines 1 and 2, respectively. Answer the following questions.

Job j	1	2	3	4	5	6	7	8
$pj1$	5	2	1	7	6	3	7	5
$pj2$	2	6	2	5	6	7	2	1

- (i) Use Johnson's rule or any viable approach in solving a two-machine makespan problem as follows. Find the makespan and the production schedule. You need to show the detailed steps to get full credit.
- (ii) When can the rule be applied to three-machine scheduling problems?
3. (20%) Let f_i be the forecast value of the i th period. Consider the following time series data and answer the following questions.

Quarter	Year		
	1	2	3
1	4	6	7
2	2	3	6
3	3	5	6
4	5	7	8

- (i) Use the most recent 3 data values in the time series as the forecast for the next period. Solve f_4 and f_5 .
- (ii) Use weighted moving average with weights of (0.5, 0.3, 0.2). The most recent observation receives the most weight, and the weight decreases for older data values. Solve f_4 and f_5 .
- (iii) Use exponential smoothing method. Let $f_1=4$ and $\alpha = 0.6$. Solve f_4 and f_5 . Make your assumptions as deemed necessary.
- (iv) Considering the seasonal components, solve f_5 and f_6 . You may illustrate your best knowledge to get partial credit.

(背面仍有題目, 請繼續作答)

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4. (30%) Answer the following questions.
- (i) Provide a conceptual schema to explain clearly how the two-card kanban system works in a just-in-time (JIT) production system. Why is it considered to be a *pull* production control mechanism?
 - (ii) Under JIT philosophy, why is inventory often said to be evil? Why is zero setup time desirable? Briefly explain the story of SMED (single minute exchange of die).
 - (iii) In contrast to JIT, why the MRP represents a *push* type production control system?
 - (iv) Explain clearly what SPT (shortest process time) dispatching rule is. Why MRP system needs dispatching rules? Is SPT applicable to the JIT system? Explain clearly.
 - (v) Another control method, constant work-in-process (*CONWIP*), is less complicated than JIT but can achieve the advantages of a pull mechanism. Provide a conceptual schema to explain clearly how CONWIP works. Is it a pull or a push type system? Show your rationale.
 - (vi) Make a comparison between pull and push production control systems with respect to inventory level, control complexity, due date control, and, throughput control.
5. (12%) A process that is in control has a mean of $\mu = 12.5$ and a standard deviation of $\sigma = .8$.
- (i) Construct an chart if sample size 4 are to be used.
 - (ii) Repeat part (i) for samples of size 8.
 - (iii) What happens to the limits of the control chart as the sample size is increased? Discuss why this is reasonable.