

※ 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。

1. The usual strategies for developing product/services operations could be: price, quality, time, flexibility, and service. Please give at least two examples to explain each of them. (15%)
2. A manager tries to forecast next year's demand of a specific product. Two methods from textbook could be used: causal method and time series method.
  - a. What are the different assumptions of these two methods? (4%)
  - b. Specifically, please describe how you would do the causal method. (4%)
  - c. Specifically, please name at least four models of time series and explain how they work. (12%)
3. What is mass customization? (5%) What are the major components of mass customization? (6%) Please give at least two examples for the mass customization. (4%)
4. The demand for a product in a hardware store is 5,000 units per year. The unit cost is \$100 and the carrying cost is 20 percent per year. The cost per order placed is \$80. The store is open 5 days per week and 50 weeks per year. The lead time for this product is 6 working days, and the standard deviation of demand is 2 units per day.
  - a. Compute the economic order quantity (EOQ) if the store uses a  $Q$  system for inventory control. (5%)
  - b. How often should orders be placed for this product if the store uses a  $P$  system for inventory control? (5%)
  - c. Under  $P$  system, compute the target inventory level for this product if the store wants to have a 95 percent service level. (5%)
  - d. During a periodic inventory review, the inventory level for this product is 50 units but the store has an unfulfilled backorder as 70 units. What order policy should be made this time? (5%)

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5. The ABC Construction Company is about to start a new project to build a grain silo for a local farm. The activities of this project are given in the following table, in which it contains the information of precedence relations and duration of these activities.

Activity	Predecessors	Duration (Days)
A	-	10
B	-	7
C	-	12
D	A	9
E	B	13
F	B	20
G	C	10
H	D	6
I	E	8
J	F, G	10
K	H, I	5

- Construct an activity-on-arrow (AOA) network based on the activity descriptions above. (5%)
- Construct an activity-on-node (AON) network based on the activity descriptions above. (5%)
- Identify the critical path. (5%)
- Now suppose that the management would like to invest extra resource to reduce the duration of activity F. The amount of reduction in duration is uncertain, but according to the experience, it is normally distributed with the expected value 4 days and the variance 1 day. Find the probability that the project can be finished in 33 days. (5%)

6. Work center A produces parts that are then processed by work center B. Kanban containers used by the work center hold 20 parts. The table below shows setup, run, move, and wait times for parts at each of the work centers. If the demand rate at work center B is 3 parts per minute, what is the minimum number of Kanban container needed between these two work centers? (10%)

	Work Center	
	A	B
Setup time (minute)	5	3
Run time per unit (minute)	2	3
Move time (minute)	10	9
Wait time (minute)	4	7