

# 淡江大學 95 學年度碩士班招生考試試題

150-1

系別：管理科學研究所

科目：生產與作業管理

准帶項目請打「V」	
✓	簡單型計算機

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本試題雙面印製

本考試使用時間為 90 分鐘，請注意時間的控制！！

**I. Definitions of Terms (2% each, 20% total)**

- 1.1) Lead time
- 1.2) Lean production
- 1.3) Seasonality
- 1.4) Service package
- 1.5) Inventory turnover
- 1.6) Rough-cut capacity planning
- 1.7) Available-to-promise
- 1.8) Reorder point
- 1.9) Infinite loading
- 1.10) Inventory velocity

**II. Problems (80%)**

2.1) Obtain estimates of quarter (seasonal) relatives for these data: (10%)

Year:	1				2				3				4
Quarter:	1	2	3	4	1	2	3	4	1	2	3	4	1
Demand:	14	18	35	46	28	36	60	71	45	54	84	88	58

2.2) A production line has three machines A, B, and C, with reliabilities of 0.99, 0.96, and 0.93, respectively. The machines are arranged so that if one breaks down, the others must shut down. Engineers are weighting two alternative designs for increasing the line's reliability. Plan 1 involves adding an identical backup line, and plan 2 involves providing a backup for each machine. In either case, three machines (A, B, and C) would be used with reliabilities equal to the original three.

- (a) Which plan will provide the higher reliability? (4%)
- (b) Explain why the two reliability are not the same? (2%)
- (c) What other factors might enter into the decision of which plan to adopt? (2%)

2.3) A large bakery buys flour in 25-pound bags. The bakery uses an average of 4,860 bags a year. Preparing an order and receiving a shipment of flour involves a cost of \$4 per order. Annual carrying costs are \$30 per bag. (2% each)

- (a) Determine the economic order quantity.
- (b) What is the average number of bags on hand.
- (c) How many orders per year will there be?
- (d) Compare the total cost of ordering and carrying flour.
- (e) If annual ordering cost were to increase by \$1 per order, how much would that affect the minimum total annual cost?

◀ 注意背面尚有試題 ▶

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- 2.4) For the set of tasks given below, do the following:
- Develop the precedence diagram. (2%)
  - Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds? (2%)
  - Determine the minimum number of workstations for output of 500 units per day. (2%)
  - Balance the line using the largest positional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (2%)
  - Calculate the percentage idle time for the line. (2%)

Task	Task Time (seconds)	Immediate Predecessors
A	45	--
B	11	A
C	9	B
D	50	--
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I

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- 2.5) Manager Christ Channing of Fabric Mills, Inc., has developed the forecast shown in the table for bolts of cloth. The figures are in hundreds of bolts. The department has a normal capacity of 275(00) bolts per month, except for the seventh month, when capacity will be 250(00) bolts. Normal output has a cost of \$40 per hundred bolts. Workers can be assigned to other jobs if production is less than normal. The beginning inventory is zero bolts.
- Develop a chase plan that matches the forecast and compute the total cost of your plan. Overtime is \$60 per hundred bolts. (5%)
  - Would the total cost be less with regular production with no overtime, but using a subcontractor to handle the excess above normal capacity at a cost of \$50 per hundred bolts? Backlogs are not allowed. The inventory carrying cost is \$2 per hundred bolts. (5%)

Month	1	2	3	4	5	6	7	Total
Forecast	250	300	250	300	280	275	270	1,925

- 2.6) Given the following information, please set up the problem (a) in a transportation table and (b) formulate it as a linear programming problem. (6% each)

	Period		
	1	2	3
Demand	550	700	750
Capacity			
Regular	500	500	500
Overtime	50	50	50
Subcontract	120	120	100
Beginning Inventory	100		
Costs			
Regular time	\$60 per unit		
Overtime	\$80 per unit		
Subcontract	\$90 per unit		
Inventory carrying cost	\$1 per unit per month		
Backorder cost	\$3 per unit per month		

- 2.7) The times required to complete each of eight jobs in a two-machine flow shop are shown in the table that follows. Each job must follow the same sequence, beginning with machine A and moving to machine B.
- Determine a sequence that will minimize make span time. (4%)
  - Construct a chart of the resulting sequence, and find machine B's idle time. (3%)
  - For the sequence determined in part a, how much would machine B's idle time be reduced by splitting the last two jobs in half? (3%)

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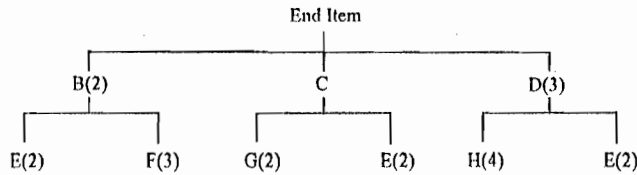
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Job	Time	
	Machine A	Machine B
a	16	5
b	3	13
c	9	6
d	8	7
e	2	14
f	12	4
g	18	14
h	20	11

2.8) The following table lists the component needed to assemble an end item, lead times, and quantities on hand.

Item	End	B	C	D	E	F	G	H
LT (wk)	1	2	3	3	1	2	1	2
Amount On hand	0	10	10	25	12	30	5	0



- (a) If 20 items of the end item are to be assembled, how many additional units of E are needed? (5%)
- (b) An order for the end item is scheduled to be shipped at the start of week 11. What is the latest week that the order can be started and still be ready to ship on time? (5%)

Note: You don't need to develop an MRP plan to determine the results.