系別：管理科學研究所　　　　科目：生產與作業管理

本考試使用時間爲 **90** 分鐘，請盡力作答，並注意時間的控制！！

I. Definitions of Terms (2% each, 26% total)

1.1) Sustainability

1.2) Life cycle assessment

1.3) Reverse engineering

1.4) Service blueprint

1.5) Delayed differentiation

1.6) Bottleneck operation

1.7) Process yield

1.8) Quality of conformance

1.9) Perpetual inventory system (continual system)

1.10) Inventory turnover

1.11) Capacity requirement planning

1.12) Planned-order releases

1.13) Load chart

II. Calculating Problems (74%, five problems)

2.1) Freight car loadings over a 12-year period at a busy port are:

Week	Number	Week	Number	Week	Number
1	200	7	350	13	460
2	245	8	360	14	475
3	280	9	400	15	500
4	275	10	380	16	510
5	300	11	420	17	525
6	310	12	450	18	541

(a) Compute a linear trend line for freight car loadings. (6%)

(b) Use the trend equation to predict loadings for Week 19. (4%)

(c) The manager intends to install new equipment when the volume reaches 800 loadings per week. Assuming the current trend continues, the loading volume will reach that level in approximately that week. (4%)

◀ 注意背面尚有試題 ▶

2.2) For the set of tasks given below, do the following:

(a) Develop the precedence diagram. (3%)

(b) 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? (3%)

(c) Determine the minimum number of workstations for output of 500 units per day. (3%)

(d) Balance the line using the largest positional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (5%)

(e) Calculate the percentage idle time for the line. (3%)

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
	193	

2.3) Prepare a run chart for the occurrences of defective computer monitors based on the following data, which an analyst obtained from the process for making the monitors. Workers are given a 15-minute break at 10:15 A.M. and 3:15 P.M., and a lunch break at noon. What can you conclude? (12%)

Interval Start time	Number of Defects	Interval Start time	Number of Defects	Interval Start time	Number of Defects
8:00	1	10:45	0	2:15	0
8:15	0	11:00	0	2:30	2
8:30	0	11:15	0	2:45	2
8:45	1	11:30	1	3:00	3
9:00	0	11:45	3	3:30	0
9:15	1	1:00	1	3:45	1
9:30	1	1:15	0	4:00	0
9:45	2	1:30	0	4:15	0
10:00	3	1:45	1	4:30	1
10:30	1	2:00	1	4:45	3

2.4) A food processor uses approximately 27,000 glass jars a month for its fruit juice product. Because of storage limitations, a lot size of 4,000 jars has been used. Monthly holding cost is 18 cents per jar, and reordering cost is $60 per order. The company operates an average of 20 days a month.

(a) What penalty is the company incurring by its present order size? (6%)

(b) The manager would prefer ordering 10 times each month but would have to justify any change in order size. One possibility is to simplify order processing to reduce the order cost. What ordering cost would enable the manager to justify ordering every other day? (5%)

(c) Suppose that after investigating ordering cost, the manager is able to reduce it to $50. How else could the manager justify using an order size that would be consistent with ordering every other day? (4%)

2.5) Manager T.C. Downs of Plum Engines, a producer of lawn mowers and leaf blowers, must develop an aggregate plan given the forecast for engine demand shown in the table. The department has a normal capacity of 130 engines per month. Normal output has a cost of $60 per engine. The beginning inventory is zero engines. Overtime has a cost of $90 per engine.

(a) Develop a chase plan that matches the forecast and compute the total cost of your plan. (8%)

(b) Compare the costs to a level plan that uses inventory to absorb fluctuations. Inventory carrying cost is $2 per engine per month. Backlog cost is $90 per engine per month. (8%)

Month	1	2	3	4	5	6	7	8	Total
Forecast	120	135	140	120	125	125	140	135	1,040