

國立中央大學 107 學年度碩士班考試入學試題

所別： 工業管理研究所 碩士班 不分組(一般生)

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科目： 生產作業與管理

本科考試禁用計算器

*請在答案卷(卡)內作答

1. (10 points) Explain the following terms.
 - (a) (3 pts) Multifunctional Workers
 - (b) (3 pts) Inventory Velocity
 - (c) (4 pts) Makespan

2. (12 points) In the 1970s, Sony manufactured color television sets at factories located in Tokyo and San Diego. When both U.S. and Japanese customers showed a distinct preference toward the Tokyo-produced sets, management decided to investigate the reasons for the preference. They found that customer preference was related to the sharpness of the color image, defined in engineering terms as color density. The target for color density used by both plants was 10, with a range of 8 to 12 being acceptable. Both plants used statistical process control to keep the production of their sets within the tolerance limits of 10 ± 2 . However, as shown in the following table, the San Diego plant produced sets with color density uniformly distributed across the range of acceptable values, whereas the Tokyo plant centered its production around the target value. If Sony estimates that it costs \$40 to repair a set with inferior color density, what is the quality loss for each plant? 【請將計算過程寫出來，否則不計分】

Color Density	Tokyo Plant	San Diego Plant
8	5	20
9	20	20
10	50	20
11	20	20
12	5	20

3. (16 points) The ABC Tool Company has taken 10 samples (during a 10-day period) of 5 slip-ring bearings. The individual observations from each sample are shown as follow. 【請將計算過程寫出來，否則不計分】

SAMPLE <i>k</i>	OBSERVATIONS (SLIP-RING DIAMETER, CM)				
	1	2	3	4	5
1	5.02	5.01	4.94	4.99	4.96
2	5.01	5.03	5.07	4.95	4.96
3	4.99	5.00	4.93	4.92	4.99
4	5.03	4.91	5.01	4.98	4.89
5	4.95	4.92	5.03	5.05	5.01
6	4.97	5.06	5.06	4.96	5.03
7	5.05	5.01	5.10	4.96	4.99
8	5.09	5.10	5.00	4.99	5.08
9	5.14	5.10	4.99	5.08	5.09
10	5.01	4.98	5.08	5.07	4.99

參考用

注意:背面有試題

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- (a) (8 pts) The company wants to develop an R-chart to monitor the process variability. Please calculate the upper and lower control limits of the R-chart using the factor table below.
- (b) (8 pts) The company also wants to develop an \bar{x} -chart to monitor the process mean. Please calculate the upper and lower control limits of the \bar{x} -chart using the factor table below.

Sample Size n	Factor for \bar{x} -Chart	Factors for R-Chart	
	A_2	D_3	D_4
2	1.88	0	3.27
3	1.02	0	2.57
4	0.73	0	2.28
5	0.58	0	2.11
6	0.48	0	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	0.22	1.78
11	0.29	0.26	1.74
12	0.27	0.28	1.72
13	0.25	0.31	1.69
14	0.24	0.33	1.67
15	0.22	0.35	1.65
16	0.21	0.36	1.64
17	0.20	0.38	1.62
18	0.19	0.39	1.61
19	0.19	0.40	1.60
20	0.18	0.41	1.59
21	0.17	0.43	1.58
22	0.17	0.43	1.57
23	0.16	0.44	1.56
24	0.16	0.45	1.55
25	0.15	0.46	1.54

4. (12 points) The I-75 Carpet Discount Store in North Georgia stocks carpet in its warehouse and sells it through an adjoining showroom. The store keeps several brands and styles of carpet in stock; however, its biggest seller is Super Shag carpet. The estimated annual demand of Super Shag carpet is 10,000 yards. The annual carrying cost per yard is \$0.75 per yard. And, the ordering cost is \$150.
- (a) (4 pts) Please calculate the optimal order size for this brand of carpet.
- (b) (4 pts) Please calculate the total inventory cost for this brand of carpet.
- (c) (4 pts) Please also calculate the number of orders that will be made annually.

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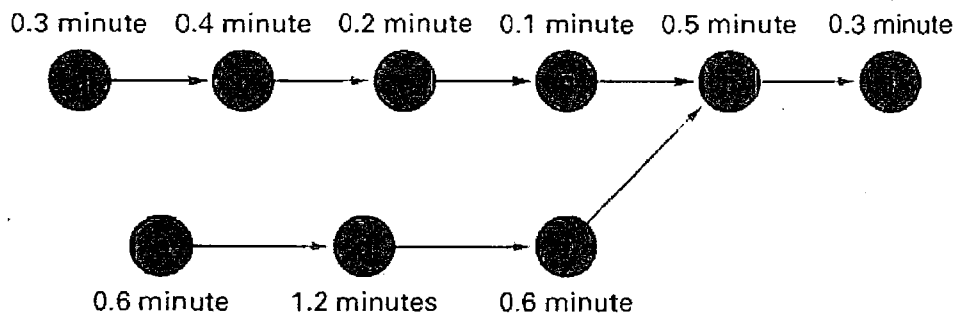
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5. (14 points) Kano model is a theory of product and service design. Please
- (a) (7 pts) list and briefly explain the three definitions of quality that employed by the model; and
 - (b) (7 pts) use a figure to portray how the three definitions of quality influence customer satisfaction or dissatisfaction related to the degree of implementation.
6. (16 points) A manager must decide how many machines of a certain type to purchase. Each machine can processes 100 customers per day. One machine will result in a fixed cost of \$2,000 per day, while two machines will result in a fixed cost of 3,800 per day. Variable cost will be \$20 per customer and revenue will be \$45 per customer.
- (a) (8 pts) Determine the break-even point for each range; and
 - (b) (8 pts) if estimated demand is 90 to 120 customers per day, how many machines should be purchased?
7. (20 points) The tasks shown in the following precedence diagram are to be assigned to workstations with the intent of minimizing idle time. Management has designed an output rate of 275 units per day. Assume 440 minutes are available per day.
- (a) (5 pts) Determine the appropriate cycle time.
 - (b) (5 pts) What is the minimum number of stations possible?
 - (c) (5 pts) Assign tasks using the "positional weight" rule: Assign tasks with highest following times (including a task's own time) first. Break ties using greatest number of following tasks.
 - (d) (5 pts) Compute efficiency.



參考