



*Great Test Scores
Come From Great Test Prep.*

COMM 225

PRODUCTIONS & OPERATIONS MANAGEMENT

**MOCK FINAL
WINTER 2014**

**MOCK
EXAM**



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ON BEHALF OF ALL THE SOS TUTORING STAFF
WELCOME!

Before you begin this mock exam, please read the following instructions:

1. This is a simulated exam. The questions are based on our instructors review of past exams, experience working with students, and assessment of those topics students have the most troubles with.
2. You have 48 hours to review and attempt the SOS Mock Exam at your own pace.
3. You are free to finish as little or as much as you would like. We recommend you attempt each question to the best of your ability.
4. On the day of the mock exam review, the instructor will work through the solutions for the group.

To make your stay with us as enjoyable as possible we please ask that you abide by the following policies:

1. Turn cell phones off or on vibrate.
2. Ensure your area is clean at the end of the day.

SOS POINTS!

- Please remember to fill out the evaluation form found in the back of your package before leaving the exam and drop it off (face down) in the designated area!

Part A – Multiple Choice Questions

1. Which of the following quality tools display major causes of poor quality on a graph?
 - a) Fishbone Diagram
 - b) Scatter Diagram
 - c) Histogram
 - d) Process Flow Chart

2. Bombardier manufactures a component that has a design target width of 10 inches with tolerances of $\pm .10$ inch. The process that produces the product has a mean of 9.99 inches and a standard deviation of 0.02 inch. The process capability index for this process is.
 - a) 1.5
 - b) 1.67
 - c) 1.83
 - d) none of the above

3. Which of the following uses the number of defects to determine the quality of a process's output?
 - a) R-chart
 - b) xbar-chart
 - c) c-chart
 - d) p-chart

4. In general, a process is considered to be in control for all the following conditions except:
 - a) all points are above the centerline
 - b) no pattern exists in the plotted points (no evidence of a run)
 - c) no points are outside the control limits
 - d) the points are randomly distributed following a normal population

5. The widely used "Six Sigma" quality is a statistical measure that equates to:
 - a) only 3.4 defects per hundred
 - b) only 3.4 defects per million
 - c) only 3.4 defects per thousand
 - d) only 3.4 defects per billion

6. Bombardier manufactures a component that has a design target width of 10 inches with tolerances of $\pm .10$ inch. The process that produces the product has a mean of 9.99 inches and a standard deviation of 0.02 inch. The process capability ratio for this process is.
 - a) 1.5
 - b) 1.67
 - c) 1.83
 - d) none of the above

7. A machine has specifications of 10 m, with a tolerance of ± 0.5 m. Historical records indicate that the average length is 9.95 m and a standard deviation of 0.1 m. According to the process capability index:
 - a) the process mean is centered on the design target
 - b) the process mean is off center and moved closer to the upper design specifications
 - c) the process mean is off center and moved closer to the lower design specifications
 - d) cannot be determined

8. The probability that a product will operate properly within an expected time frame is the dimension of quality known as.
 - a) performance
 - b) reliability
 - c) conformance
 - d) durability

9. Which concept did the Japanese perfect during World War II?
 - a) Just-in-Time
 - b) PERT
 - c) Just-in-Case
 - d) Service Design

10. Which of the following quality tools display the relationship between two variables on a graph?
 - a) Fishbone Diagram
 - b) Scatter Diagram
 - c) Histogram
 - d) Process Flow Chart

11. Which of the following term refers to a situation when a customer refuses to join a line because he believes it is too long?
 - a) Reneging
 - b) Balking
 - c) Jockeying
 - d) None of the above

12. Which of the following term refers to a situation when a customer waiting in a line moves from one line to another because he believes it is moving faster?
 - a) Reneging
 - b) Balking
 - c) Jockeying
 - d) None of the above

13. Which of the following is not a basic assumption of Waiting Lines?
- Poisson Arrival Rate
 - Infinite queue length
 - First in, First Out
 - None of the above
14. For the process to be capable of meeting design specification:
- the process capability index must be equal to or greater than 0
 - the process capability index must be less than 1
 - the process capability index must be equal to or greater than 1
 - the process capability index must be less than 0
15. Which of the following quality tools display the frequency of data related to a quality problem?
- Fishbone Diagram
 - Scatter Diagram
 - Histogram
 - Process Flow Chart
16. Point Zero gets about 100 customers per day. The manager wants to calculate how many sales people should be hired 1, 2, 3 or 4. It is known that the average waiting time will be 8 minutes with one salesperson, 5 minutes with 2, 3 minutes with 3 and 2 minutes with 4 sales people. Each minute in customer waiting time costs the store \$2. Sales people make \$30/hour. The store operates from 10AM to 8PM. How many sales people should be hired?
- 1
 - 2
 - 3
 - 4
17. Which of the following is not a benefit of Lean Production
- Reduced Inventory
 - Improved quality
 - Increased productivity
 - Longer lead time
18. The degree to which a product meets pre-established standards is known as.
- performance
 - reliability
 - conformance
 - durability

19. Which of the following failure costs include scrap, rework, and downtime?
- a) External
 - b) Process
 - c) Internal
 - d) none of the above
20. Which of the following term refers to a situation when a customer leaves the line he's been in because he believes it is too long?
- a) Jockeying
 - b) Balking
 - c) Reneging
 - d) None of the above

Long Answer Questions

1. The manager of a cafeteria at a university wants to monitor the service quality of the checkout process. Students have complained that some cashiers take too long to add up the cost of their food, collect the money and give change. This has led to unnecessarily long lines during busy periods. To monitor performance, the manager observed and timed how long it took his cashiers to checkout customers. The data for 16 samples is given in the following table.

Sample No.	Mean (\bar{x}) seconds	Range (R) in seconds
1	24.8	23
2	20.2	21
3	22.4	22
4	21.4	28
5	18.2	19
6	21.2	13
7	19.2	23
8	20.2	17
9	27.4	32
10	18.8	24
11	18.4	19
12	19.6	14
13	21.4	12
14	23.2	15
15	28.2	24

Sample No.

Checkout times (in seconds)

16

29, 38, 24, 25, 23

- a) Construct suitable control chart(s) using three sigma limits.

b) Do the control chart(s) indicate that the process is in control or out of control?

2. An airport has a single runway and one air traffic controller. The air traffic controller works between 9 am and 7 pm since the lighting system of the runway is broken. Therefore all flights have to land and take off during this time period only. It takes the controller an average of 6 minutes to land a plane and clear the runway. The landing and clearing time is assumed to follow a negative exponential distribution. The planes arrive at random according to Poisson distribution. On the average, there are 60 planes per day (between 9 am and 7 pm) arriving at the airport.
 - a) Determine the average time a plane circles before landing.

- b) Determine the average time it takes a plane to clear the runway once it notifies the airport that it has arrived and wants to land.

- c) Assume that a second air traffic controller (with the same efficiency of the first controller) is hired at a cost of \$300 per day. The arrival rate of planes does not change. Further assume that the two controllers serve the same single queue. If the airport management has to pay \$75 for every minute a plane spends circling in the air, is the employment of second traffic controller justified?

- d) Consider the original situation where only one air traffic controller is employed. Suppose that the Aviation Authority will impose a rule next month that will limit the amount of time an air traffic controller can work. According to this rule, an air traffic controller will only work 30 minutes on the average in an hour. Thus, the controller will rest 30 minutes on the average in an hour to relieve tension. Should the airport management hire a second air traffic controller next month irrespective of cost considerations?

3. Shell-wash is a car-wash company with two facilities. The first facility is an automatic car wash, whereas the second one provides manual car washing.

The arrival rate of cars at the first facility is 8 cars per hour. Each car is washed in exactly 3 minutes. Only one car can be washed at a time. Answer questions (a) and (b) for the first facility

- a) Calculate the average time a car spends in the system.

- b) Calculate the average number of cars waiting to be washed.

Currently the second facility employs four employees who work as a team. On the average, it takes 10 minutes for the team to wash a car manually. One car is washed at a time and the washing time is found to follow a negative exponential distribution. On the average, it is observed that there are no cars in the system 40% of the time. Answer questions (c), (d) and (e) for the second facility

- c) Calculate the average time spent per car waiting before the washing starts.

- d) Calculate the average number of cars in the system.

- e) What is the probability of finding at most two cars waiting to be washed?

The owner of the Shell-wash is planning, for the second facility, to employ a second team of washers with the same efficiency as the first team. This second team would serve the same queue as the first team. Cars waiting in the only line-up would proceed to the team that becomes available. Answer questions (f), (g) and (h) for the second facility with two teams

- f) What is the probability of finding no cars in the system?

- g) Calculate the average time spent by a car between arrival at the facility and its departure after being washed.

- h) Calculate the total waiting time to be saved per day if the second team is employed.
(Assume 12 working hours in a day)

4. Mrs. Agassi is establishing an investment portfolio that will include stocks and bond funds. She has \$750,000 to invest. The portfolio is to include no more than 80% stocks. The average annual return for the stock fund she plans to invest in is 12%, while the average annual return for the bond fund is 4%. She further estimates that the most she could lose in the next year in the stock fund is 20%, while the most she could lose in the bond fund is 10%. To reduce her risk she wants to limit her potential maximum losses to \$100,000.
- a) Formulate a linear programming model for this problem.

b) Solve this model graphically.

5. Oh Mon Dieu! is a Mile-End based Micro-Root-Brewery which produces root beer for the Québec and Ontario markets. Prepping for the busy summer months (April to September), the following demand forecast has been developed: April – 4,000 pallets, May – 4,800 pallets, Jun – 5,600 pallets, Jul – 7,200 pallets, Aug – 6,400 pallets & Sept – 5,000 pallets.

Beginning inventory = 0

Overtime labour = \$30/pallet

Part time labour = \$40/pallet

Holding Cost = \$2/pallet/month

Regular labour cost = \$20/pallet

Backorder cost = \$10/pallet/month

Regular labour capacity = 5,000 pallets/month with 50 workers

A minimum cost aggregate production plan must be developed with the variable listed below. Compute a total cost for each plan. Which is the lowest cost plan?

- a) Use some part time & some overtime workers (each type of worker can be assigned up to 500 pallets per month).
- b) Work regular staff extra hard into overtime (maximum 1000 pallets per month in overtime work).

Period		1	2	3	4	5	6	Total
Forecast								
Output								
Regular								
Overtime								
Part time								
Output - Forecast								
Inventory								
Beginning								
Ending								
Average								
Backlog								
Costs:								
	@							
	@							
	@							
	@							
	@							
	@							
	@							
	@							
Total								

Period		1	2	3	4	5	6	Total
Forecast								
Output								
Regular								
Overtime								
Part time								
Output - Forecast								
Inventory								
Beginning								
Ending								
Average								
Backlog								
Costs:								
	@							
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	@							
	@							
	@							
Total								

Period		1	2	3	4	5	6	Total
Forecast								
Output								
Regular								
Overtime								
Part time								
Output - Forecast								
Inventory								
Beginning								
Ending								
Average								
Backlog								
Costs:								
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	@							
	@							
	@							
Total								

Period		1	2	3	4	5	6	Total
Forecast								
Output								
Regular								
Overtime								
Part time								
Output - Forecast								
Inventory								
Beginning								
Ending								
Average								
Backlog								
Costs:								
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Total								

Evaluation Form

Please rate the tutor on a scale of 10 to 1:

10 = completely agree, 9 = strongly agree, 8 = agree, 7 = somewhat agree, 6 = neutral, 5 = somewhat disagree, 4 = disagree, 3 = strongly disagree, 2 = completely disagree, N/A = not applicable

Date: _____

Professor: _____

This evaluation will help us improve our product so please be as straightforward as possible!!

MOCK Exam

Answer (10 to 1)

1. The Mock Exam teaching format was helpful to understand the material. _____
2. The Mock Exam covered all the course material. _____
3. The Mock Exam questions were challenging enough. _____
4. The solutions for the Mock Exam were complete. _____
5. I was satisfied with the overall performance of the tutor. _____
6. I enjoyed the mock exam format of tutoring. _____
7. I would consider using SOS Tutoring again. _____

Please evaluate the following question separate from actual course

Answer (A, B, C)

8. What is the ideal format to teaching a Mock Exam? _____
 - a. Students being given 20-30 minutes to solve a certain number of questions alone, followed by a tutor-lead review of the answers to those questions. This process is repeated until the completion of the entire questions in the Mock Exam.
 - b. Students being given 2 hours to solve all the questions in the Mock Exam, followed by a 3 hour tutor-lead review of the answers to those questions.
 - c. Students given the Mock Exam to solve at home before the class. During the class, tutor reviews the questions and solutions to the Mock Exam with the students for the full 3 hours.
 - d. Other formats? Please write here: _____

9. Is there anything you would like to see added, removed or modified with regards to the Mock Exam format? (Please leave as much detail as possible! It's really appreciated ☺)

We appreciate your business and hope you consider SOS Tutoring for all your tutoring needs!