ENGI 7943 – Production & Operations Management
Midterm – June 29, 2006

Name: _____________________     Student #: ___________________

MULTIPLE CHOICE. Choose the best alternative. (1 mark each)

1) Which one of the following statements regarding operations management is true?  1) ______
   A) Inputs to a production system include capital and materials, but not human resources.
   B) Customer participation and information on performance are two special types of inputs to
      a production system.
   C) Typical inputs to a production system are processes and consumer goods.
   D) Operations management deals only with manufacturing organizations because service
      organizations do not have tangible outputs.

2) Decisions that are less structured and have long-term consequences are:  2) ______
   A) operational decisions.          B) functional decisions.
   C) tactical decisions.            D) strategic decisions.

3) Which of the following is NOT a trend in operations management?  3) ______
   A) Increased presence of the manufacturing sector
   B) Increased emphasis on quality
   C) Increased global competition in both manufacturing and services
   D) Pressures to address social issues such as pollution and workplace diversity

4) A process produces 5000 units of output that yield $6 per unit. Resources contributed to this
   output are 200 hours of labor at $15 per hour, materials at $700 and overhead at $300. What is
   the labor productivity?  4) ______
   A) 20       B) 25       C) 40       D) 30

5) Which one of the following statements about break-even analysis for evaluating products or
   services is true?  5) ______
   A) The break-even quantity will tend to increase as the variable cost per unit of production
      decreases.
   B) Increasing the unit selling price has the effect of increasing the break-even quantity.
   C) A restaurant’s opening of downsized facilities with only drive-through service is an
      example of lowering fixed costs and the break-even quantity.
   D) As sales increase beyond the break-even quantity, total before-tax profits tend to decrease.

6) A new product will sell in the market for $12. It costs $7 (unit variable cost) to manufacture on a
   new lathe machine. If the break-even quantity is 10,000 units, what is the annual fixed cost
   involved in acquiring the machine and in paying other fixed costs?  6) ______
   A) Less than $40,000
   B) Greater than $55,000 but less than or equal to $70,000
   C) Greater than $40,000 but less than or equal to $55,000
   D) Greater than $70,000
7) California Manufacturing, Inc. is now evaluating two new product ideas, and management has decided to apply the preference matrix method. The following table shows five criteria with different weights and individual scores of each product idea. If management has established a threshold of 800, which product(s) should be accepted for further development?

<table>
<thead>
<tr>
<th>Performance Criterion</th>
<th>Weight</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market potential</td>
<td>40</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Profitability</td>
<td>30</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Operations compatibility</td>
<td>15</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Investment requirements</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Risk</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Score

Product

A) Product A
B) Product B
C) Both products A and B
D) Neither product A nor B

Table A.2

A company that is introducing a new product has to choose between three different manufacturing methods, referred to as methods A, B, and C. Depending on the demand for the product, they have forecast different levels of revenue for the year (values are in thousands). The company has identified three possible states of nature for economic growth and named them High, Medium, and Low.

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method A</td>
<td>$80</td>
<td>$61</td>
<td>$38</td>
</tr>
<tr>
<td>Method B</td>
<td>$22</td>
<td>$46</td>
<td>$100</td>
</tr>
<tr>
<td>Method C</td>
<td>$9</td>
<td>$14</td>
<td>$52</td>
</tr>
<tr>
<td>Method D</td>
<td>$44</td>
<td>$55</td>
<td>$24</td>
</tr>
</tbody>
</table>

8) Using the information in Table A.2, which alternative is best in accordance with a decision criterion of Laplace?

A) A
B) B
C) C
D) D

9) Core competencies are:
A) another name for competitive priorities.
B) product or service attributes that represent the needs of a particular market segment.
C) various flow strategies.
D) the unique resources and strengths that management considers when formulating strategy.

10) A steel company has categorized its customers as standard steel customers, special bar-quality steel customers, and mixed-steel customers. This is an example of:
A) a needs assessment.
B) market segmentation.
C) a mission statement.
D) a joint venture with its customers.
11) A crafty operations manager has developed this decision tree to evaluate the alternatives for a planned expansion. If the probability of high demand is 0.6, what is the best course of action?

![Decision Tree Diagram]

A) Alternative A  B) Alternative B  C) Alternative C  D) Alternative D

12) Which one of the following statements concerning competitive priorities is TRUE?
   A) By providing customized semiconductor chips to companies, National Semiconductor Corporation is competing mainly on the basis of delivery speed.
   B) All eight dimensions of competitive priorities should be given equal emphasis in order to survive in the increasingly competitive market.
   C) Federal Express has registered impressive increases in sales and profits by emphasizing development speed.
   D) A firm competing along the dimension of volume flexibility will generally be expected to do well with a product or service with a seasonal or cyclical demand pattern.

13) In QFD analysis, the voice of the engineer differs from the voice of the customer:
   A) because the voice of the accountant must be heard after the customer (but before the engineer) in order to ensure cost competitiveness.
   B) because the engineering function must translate the customer’s voice into technical measures.
   C) because the engineering function does not need to address customer issues, only product issues.
   D) in that the voice of the engineer enters the analysis near the end of the design process.

14) The product development team ensures compatibility of the proposed product with corporate strategy and regulatory standards in the:
   A) analysis stage.  B) design stage.  C) development stage.  D) full launch stage.

15) A good risk management plan will contain which of these elements?
   A) The number of unacceptable outcomes
   B) A prediction of the impact of each risk on the project
   C) The number of acceptable outcomes
   D) The project manager’s tolerance level for risk
16) If a project has multiple critical paths, which of the following variances should be used in analyzing project completion-time probabilities?
   A) The sum of the variances for all critical paths
   B) The critical path with the largest variance
   C) The critical path with the smallest variance
   D) The average variance of the critical paths

17) Assume that activity G has the following times:
   Early start time = 7 days
   Early finish time = 13 days
   Late start time = 15 days
   Late finish time = 21 days
   Which of the following statements is TRUE about activity G?
   A) Activity G is on the critical path.
   B) Activity G has a slack time of 8 days.
   C) Activity G takes 14 days to complete.
   D) Activity G takes 2 days to complete.

18) Four dimensions must be considered in making decisions on process. Which one of the following correctly identifies all four major process decisions?
   A) Capital intensity, process choice, inventory placement, resource flexibility, and customer involvement
   B) Capital intensity, resource flexibility, facility location, vertical integration, and process choice
   C) Product or service life cycle, capital intensity, vertical integration, process choice, and customer involvement
   D) Capital intensity, resource flexibility, customer involvement, and process structure

19) Which of the following statements about process choice is best?
   A) Continuous flow processes are very capital intensive.
   B) A custom cake operation is an example of a batch process.
   C) A batch process typically has a standard sequence of operations through the facility.
   D) Automobiles and appliances are examples of products created using a continuous flow process.

20) Which of the following statements regarding capital intensity is NOT true?
   A) Leasing is a method to acquire equipment while defraying financial risk.
   B) Decreased amounts of automation increase capital intensity.
   C) Automation refers to a system or piece of equipment that is self-regulating and self-acting.
   D) Capital intensity can be a prohibitive investment for low-volume operations.

21) Which one of the following statements on the concept of gaining focus is best?
   A) Small sizes of many focused factories make it difficult to compete on the basis of shorter lead times.
   B) Plants within plants are different operations within a facility that can have individualized competitive priorities and processes.
   C) Focused factories maximize the amount of customization.
   D) Focused factories are large factories producing all the products that the company offers.
22) Performance measures such as average response times, repair times, and percent defective are referred to as:
   A) targets.  
   B) benchmarks.  
   C) tactics.  
   D) metrics.

23) A process troubleshooter has to decide which problem to address first with his or her cause-and-effect diagram. The data analysis tool that will help him decide which problem to tackle first is a:
   A) check sheet.  
   B) Pareto chart.  
   C) flow chart.  
   D) scatter diagram.

24) Xerox benchmarked its distribution system against that of L. L. Bean’s. This is an example of:
   A) internal benchmarking.  
   B) functional benchmarking.  
   C) competitive benchmarking.  
   D) disaggregate benchmarking.

25) Which one of the following statements about benchmarking is TRUE?
   A) Benchmarking focuses on setting quantitative goals for continuous improvement.
   B) Benchmarking is useful only when a company compares itself against other companies.
   C) Because of the power of benchmarking, specific plans of action are not necessary.
   D) Benchmarking is the same as the plan-do-check-act cycle in continuous improvement.

SHORT ANSWER.  SHORT ANSWER. Use the space provided. (4 marks each)

26) What is the difference between the "push" and "pull" methods of material flow? Describe how push was changed to pull in the model airplane exercise completed in the boardroom?
27) The site selection team you formed last quarter meets with you in the conference room to present the results of their thoughtful analysis. They have collectively logged 200,000 frequent flyer miles while conducting their investigation. The conference room table sags under the weight of their massive report and all team members sport deep tans. As the leader drones on about their completely objective approach to the problem he projects a slide containing the following information about their location of choice.

<table>
<thead>
<tr>
<th>Location</th>
<th>Weight (A)</th>
<th>Score (B)</th>
<th>Weighted Score (A x B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>20</td>
<td>8</td>
<td>160</td>
</tr>
<tr>
<td>Utility Costs</td>
<td>25</td>
<td>5</td>
<td>125</td>
</tr>
<tr>
<td>Labor Skill</td>
<td>25</td>
<td>6</td>
<td>150</td>
</tr>
<tr>
<td>Labor Cost</td>
<td>20</td>
<td>7</td>
<td>140</td>
</tr>
<tr>
<td>Political climate</td>
<td>10</td>
<td>4</td>
<td>40</td>
</tr>
</tbody>
</table>

Final Weighted Score 615

What questions do you, a conscientious vice-president level executive, have for the team about this portion of their analysis?

28) Describe the differences among make-to-order, assemble-to-order, and make-to-stock strategies from the producer’s and from the customer’s perspective.
29) As the operations manager of the bookstore on your college campus, you are keenly aware of the seasonality of demand for your wares. At the start of each semester you puzzle over the number of checkout clerks to schedule and finally decide to model your predicament using Monte Carlo simulation. Describe the simulation process and indicate what assumptions you must make at each step.

30) Describe how time-cost tradeoffs for project activities should be identified and analyzed.
A manufacturing firm is considering whether to produce or outsource the production of a new product. If they produce the item themselves, they will incur a fixed cost of $950,000 per year, but if they outsource overseas there will be a $1.5 million cost per year. The advantage of outsourcing overseas is the variable cost of 95¢ per unit, which is a fraction of their $43/unit cost in their own union shop. Regardless where these devices are made, they will sell for $98 each. What is the break-even quantity for each alternative? Solve this problem graphically and algebraically. (8 Marks)
33) A company that is introducing a new product has to choose between four marketing plans, A through D. The marketing plans are forecasted to have varying payoffs, depending on the level of advertising. The probability of high demand is 0.6 and of low demand 0.4. Use the following Laplace decision rules to select the marketing plan: (7 Marks)

<table>
<thead>
<tr>
<th>Marketing Plan</th>
<th>Payoff (Dollars)</th>
<th>High Demand</th>
<th>Low Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100,000</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>50,000</td>
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<td></td>
</tr>
<tr>
<td>C</td>
<td>75,000</td>
<td>35,000</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>125,000</td>
<td>10,000</td>
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</table>
Consider the tasks, durations, and predecessor relationships in the following network. Draw the network and answer the questions that follow. (10 Marks)

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Immediate Predecessor(s)</th>
<th>Optimistic (Weeks)</th>
<th>Most Likely (Weeks)</th>
<th>Pessimistic (Weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>---</td>
<td>4</td>
<td>7</td>
<td>10</td>
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<tr>
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<td>D, C</td>
<td>6</td>
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</table>

a. What is the expected time for activity B?
b. What is the variance for activity B?
c. Based on the calculation of estimated times, what is the critical path?
d. What is the estimated time of the critical path?
e. What is the activity variance along the critical path?
f. What is the probability of completion of the project before week 42?