Exam 1 Study Guide

Sample Questions

I. True/False (20 points)
The operations manager has primary responsibility for making operations system design decisions, such as system capacity and location of facilities.

Service involves a much higher degree of customer contact than manufacturing.

Productivity is defined as the ratio of output to input.

Strategy includes both organizational and functional strategies.

Concurrent Engineering is another term for sequential development.

Standardization refers to the extent to which there is absence of variety in a product, service, or process.

Job enrichment involves giving a workers a greater share of the total task which is why they feel enriched.

Design capacity refers to the maximum output that can possibly be attained.

Aggregate planning is used to establish general levels of employment, output, and inventories over an intermediate-range of time.

The inventory records contain information on the status of each item by time period.

II. Multiple Choice (30 points)
Budgeting, analysis of investment proposals, and provision of funds are activities associated with the ________ function.
A. operation
B. marketing
C. purchasing
D. finance
E. internal audit

Which of the following is not a characteristic of service operations?
A. intangible output
B. high customer contact
C. high labor content
D. easy measurement of productivity
E. low uniformity of output

Productivity is expressed as:
A. output plus input
B. output minus input
C. output times input
D. output divided by input
E. input divided by output

The fundamental purpose for the existence of any organization is described by its:
A. policies
B. procedures
C. corporate charter
D. mission statement
E. bylaws

The external elements of SWOT analysis are:
A. strengths and weaknesses
B. strengths and threats
C. opportunities and threats
D. weaknesses and opportunities
E. strengths and opportunities

Incorporating design for disassembly (DFD) principles in product design helps firms with __________ design issues.
A. Legal
B. Social
C. Re-use
D. Reverse engineering
E. Re-engineering

The research and development activity which starts after positive research results are available and attempts to turn these results into useful commercial applications is:
A. basic research
B. applied research
C. development
D. redesign
E. commercial research

The structural approach for integrating customer requirements into every aspect of product development is known as:
A. total quality management
B. customer satisfaction
C. quality function deployment
D. customer integration
E. a product development team

Behavioral approaches to job design include:
A. Specialization
B. Ergonomics
C. Job Rotation
D. Flow Process Charts
E. SIMO Charts

Which of the following most closely describes job enlargement?
A. horizontal loading
B. increasing the level of responsibility associated with a job
C. transferring workers through a series of jobs to increase their scope of experience
D. increasing the amount of workspace assigned to a worker
E. assigning two jobs to the same worker

A job had an observed time of 10 minutes, a performance rating of .90, and an allowance factor of 20 percent of job time. Twenty-five cycles were timed. Standard time for the job in minutes is:
A. 10.0
B. 10.8
C. 12.5
D. 15.0
E. depends on the number of cycles observed

A basic question in capacity planning is:
A. what kind is needed
B. how much is needed
C. when is it needed
D. all of the above
E. none of the above

The ratio of actual output to design capacity is:
A. design capacity
B. effective capacity
C. actual capacity  
D. efficiency  
E. utilization

Capacity in excess of expected demand that is intended to offset uncertainty is a:  
A. margin protect  
B. line balance  
C. capacity cushion  
D. timing bubble  
E. none of the above

Aggregate planning is capacity planning for:  
A. the long range  
B. the intermediate range  
C. the short range  
D. typically one to three months  
E. typically one or more years

### III. Problem Solving (30 points)

**Question 1 (6 points)**  
The weekly output of a production process is shown below, together with data for labor and material inputs. The standard inventory value of the output is $125 per unit. Overhead is charged weekly at the rate of $1500 plus .5 times direct labor cost. Assume a 40-hour week and an hourly wage of $16. Material cost is $10 per running foot. What is the average multi-factor productivity for this process?

**Question 2 (7 points)**  
An analyst has observed 28 work cycles, for which the average cycle time was five minutes and the performance rating was 1.05. Allowances for the department are 25 percent of job time. What standard time is appropriate for this job?

**Question 3 (8 points)**  
A system consists of three components A, B, and C. C is a backup for B and works when B is down. A and B (or its backup) must work together for the entire system to work. Reliability of each component is marked below.

1) Compute the system reliability. (5 points)
2) Now we have an omnipotent additional backup D with reliability only 0.1. Should we use it at all? If using it, where should it be attached to obtain the highest system reliability? (Hint: Attaching to B is equivalent to attaching to C) (3 points)

Given the following data for a make or buy decision:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Fixed Cost</th>
<th>Variable Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy</td>
<td>$0 per year</td>
<td>$8 per unit</td>
</tr>
<tr>
<td>Make</td>
<td>$100,000 per year</td>
<td>$4 per unit</td>
</tr>
</tbody>
</table>

(1) For what range of output would you prefer to buy?

(2) For what range of output would you prefer to make?

IV. Small Essay (20 points)

Question 5 (8 points)
List at least 3 key issues for today’s business operations and explain how each of them affects today’s business operations.

Question 6 (12 points)
Given the projected demands for the next six months, prepare an aggregate plan that uses inventory, regular time and overtime, and backorders. The plan must wind up with no units in ending inventory in Period 6. Regular time capacity is 150 units per month. Overtime capacity is 20 units per month. Overtime cost is $30 per unit, backorder cost is $20 per unit, inventory holding cost is $5 per unit,
regular time cost of $20 per unit, and beginning inventory is zero.

<table>
<thead>
<tr>
<th>Month</th>
<th>Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>180</td>
</tr>
<tr>
<td>2</td>
<td>170</td>
</tr>
<tr>
<td>3</td>
<td>140</td>
</tr>
<tr>
<td>4</td>
<td>150</td>
</tr>
<tr>
<td>5</td>
<td>130</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
</tr>
</tbody>
</table>
Keys
I. True/False

FALSE; TRUE; TRUE; TRUE; FALSE; TRUE; TRUE; TRUE; TRUE

II. Multiple Choices

DDDDCCCCABDECB

III. Problem Solving

1.

<table>
<thead>
<tr>
<th>Week</th>
<th>Output</th>
<th># Workers</th>
<th>Material (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>412</td>
<td>6</td>
<td>2840</td>
</tr>
<tr>
<td>2</td>
<td>364</td>
<td>5</td>
<td>2550</td>
</tr>
<tr>
<td>3</td>
<td>392</td>
<td>5</td>
<td>2720</td>
</tr>
<tr>
<td>4</td>
<td>408</td>
<td>6</td>
<td>2790</td>
</tr>
</tbody>
</table>

\[ \text{Week 1: } 412(125) \div (6(40)(16) + 2840(10) + .5(6)(40)(16) + 1500) = \frac{51500}{35660} = 1.444 \]

\[ \text{Week 2: } 364(125) \div (5(40)(16) + 2550(10) + .5(5)(40)(16) + 1500) = \frac{45500}{31800} = 1.431 \]

\[ \text{Week 3: } 392(125) \div (5(40)(16) + 2720(10) + .5(5)(40)(16) + 1500) = \frac{49000}{33500} = 1.463 \]

\[ \text{Week 4: } 408(125) \div (6(40)(16) + 2790(10) + .5(6)(40)(16) + 1500) = \frac{51000}{35160} = 1.451 \]

Avg. = \((1.444 + 1.431 + 1.463 + 1.451)/4 = 5.789/4 = 1.447\)

2.

\[ \text{OT = 5 minutes} \quad \text{NT = OT*PR = 5*1.05 = 5.25 minutes} \]

\[ \text{PR = 1.05} \quad \text{ST = NT*AFjob = 5.25*1.25 = 6.5625 minutes} \]

\[ \text{A = 25%} \quad \text{AFjob = 1 + .25 = 1.25} \]

3. (1) 0.864; (2) use it on A, the reliability will be 0.8736.

4. (1) 1-24,999; (2) 25,001 and above (be careful about the range)

IV. Small Essay
1. Example key issues: economic conditions, the internet, ecommerce, ebusiness, globalization, outsourcing, quality problems, risk management. You can also list key issues that are not in the textbook but you have to convince the reader that it is a critical issue.

2. The aggregate plan should look like this:

<table>
<thead>
<tr>
<th>Period</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast</td>
<td>180</td>
<td>170</td>
<td>140</td>
<td>150</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>Beg Inv</td>
<td>0</td>
<td>-10</td>
<td>-30</td>
<td>-20</td>
<td>-20</td>
<td>0</td>
</tr>
<tr>
<td>RT-Prod</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>OT-Prod</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End Inv</td>
<td>-10</td>
<td>-30</td>
<td>-20</td>
<td>-20</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

With costs as follows:

<table>
<thead>
<tr>
<th>Period</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT-Prod</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>OT-Prod</td>
<td>600</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Holding</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Back-Ord</td>
<td>200</td>
<td>600</td>
<td>400</td>
<td>400</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total cost of this plan is $20,200.