

Purchasing and Materials Management Exam II

Please complete the following exam. Read all instructions carefully and answer each question asked. Calculations are important but so are explanations and dialogue.

1. You are required to turn in this exam by the due date listed on the course website. Late papers will not be accepted.
2. Your work should consist of:
 - a. A cover sheet with your name and the date.
 - b. A **1-PAGE** Executive Summary of your work including explanations, calculations, diagrams, etc. Please feel free to include as much detail as you think necessary but remember you have limited space.
 - c. Executive summaries are expected to be typewritten (i.e., MS-Word, WordPerfect). However, calculations can be handwritten. Clarity and neatness are expected.
 - d. Please refer to the **website for further information regarding writing executive summaries**. You may use any font and spacing that is reasonable. i.e., 0.25-inch margins and font size 10 are at the low end of reasonable. Remember you are presenting this to your boss.
 - e. Please attach all calculations, spreadsheets, diagrams, graphs, etc., to the back of the executive summary and label the section Appendix A. If you are running short on space in your executive summary, you may reference pages in the Appendix. (This may come in handy for certain diagrams, graphs, etc.)
3. You will be graded on both your calculations and your presentation. Calculations will be weighted approximately 75% and presentation (i.e., the executive summary) will be weighted 25%. Just a reminder, if I can't read it or find it, I can't grade it.

A typical exam will have the following parts:

- a cover page with your name and date,
- your executive summary,
- an appendix cover page, and
- your appendix pages.

You may turn in both a Word file and an Excel file (the Excel file would most likely contain your Appendix material).

NOTE: I WANT ONLY 1 (ONE) EXECUTIVE SUMMARY THAT INCLUDES ALL EXAM PROBLEMS. DO NOT CREATE MORE THAN 1 (ONE) EXECUTIVE SUMMARY!! PLEASE EMAIL ME IF THIS IS NOT CLEAR.

Purchasing and Materials Management Exam II

Introduction and Background:

The Beerstore packages specialty beers into gift packs and sells them via the Internet. Its most popular items are the Northwest Grunge Sampler and the Deep South Hooch Sampler. The product structure trees are given in Figure 1.1

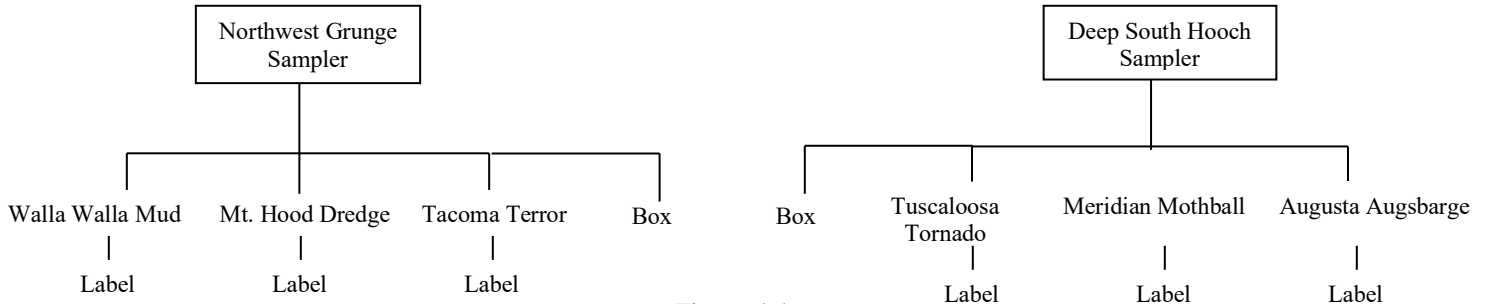


Figure 1.1

Two of each beer is included in each of the samplers (i.e., each sampler has six beers total), each bottle needs one disclaimer label (all bottles use the same disclaimer label), and each sampler needs one box (each sampler uses the same type of box).

The Forecast

The Beerstore has historical data on their yearly sales demand (see table below). Jody knows they have been using the last year's demand as the forecast for the upcoming year (i.e., the Naïve method). However, she knows this most likely is not the best method of forecasting demand. She believes she can show that a 3-year Moving Average or a 5-year Moving Average method can do better. Help Jody create a naïve, a 3-year Moving Average, and a 5-year Moving Average forecast for 2017. Calculate MAD and find which forecasting method does the better job.

| Year | Demand | Year | Demand |
|------|--------|------|--------|
| 2004 | 6750 | 2011 | 6300 |
| 2005 | 6300 | 2012 | 5900 |
| 2006 | 6850 | 2013 | 5000 |
| 2007 | 5175 | 2014 | 6300 |
| 2008 | 6650 | 2015 | 6000 |
| 2009 | 5400 | 2016 | 6800 |
| 2010 | 6065 | 2017 | ??? |

The Aggregate Production Plan

The Beerstore splits the forecast they develop for their gift packs over the next 4 quarters. Use the most accurate forecast you developed earlier to create an aggregate production plan. The following table contains the fraction of demand by quarter. Apply your forecast to these percentages.

| Quarter | Fraction of Demand |
|---------|--------------------|
| 1 | 1/6 |
| 2 | 4/15 |
| 3 | 7/30 |
| 4 | 1/3 |

The cost of carrying inventory is calculated at \$5.00 per unit per period. Jody has been told they cannot afford stockouts and there is no backordering. At the APP level no work can be subcontracted and overtime work by employees is not allowed. However, the company will allow extra inventory to carry over from quarter to quarter and year to year. The Beerstore has 5 workers on staff now and each worker can produce on average 100 samplers per quarter. The labor force is fairly liquid and workers can be readily hired or laid off. Hiring costs are \$500 per worker and layoff costs are \$700 per worker.

Purchasing and Materials Management Exam II

Her boss suggested they just follow the demand, a chase strategy, through the quarters to minimize un-needed inventory. However, the company HR department always complains about hiring and firing costs so they have suggested a pure level strategy. Jody needs to develop an aggregate production plan (APP) for the data that minimizes costs but complies with all company policies. Help Jody out.

The Master Production Schedule

Jody wishes to use the APP just developed to help create a Master Production Schedule and drive a Materials Requirements Plan for the next quarter. Jody knows that demand for the gift packs is split evenly between the two samplers (i.e., 50% of demand is Grunge and 50% Deep South). In addition, the following weekly breakdown, in percentage of the first quarter's APP amount, has been developed with the weekly capacity included. Help Jody develop the MPS and MRP for quarter one (i.e., figure out how much they will need to produce in which weeks 1-12). Although Jody will need to develop the APP for all four quarters she is being asked only to develop the MPS and MRP for the first quarter now.

Master Production Schedule as % of APP

| Item | Weeks in Quarter | | | | | | | | | | | |
|--------------------------|------------------|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| NW Grunge Sampler | 0% | 10% | 0% | 10% | 20% | 0% | 10% | 20% | 10% | 10% | 0% | 10% |
| NW Grunge Capacity | 50 | 50 | 100 | 100 | 25 | 25 | 25 | 25 | 75 | 25 | 50 | 125 |
| Deep South Hooch Sampler | 0% | 0% | 20% | 0% | 10% | 0% | 20% | 20% | 10% | 10% | 10% | 0% |
| Deep South Capacity | 25 | 25 | 100 | 100 | 75 | 75 | 25 | 25 | 75 | 25 | 25 | 125 |

Given the following bill of materials, master production schedule, and inventory master file, generate MRP matrices for each item and identify orders that are past due and rectify any capacity issues. Jody has a couple of alternatives for items that are past due. She can expedite any items that are purchased (boxes, labels, and individual beers). Expediting costs twice as much as the unit cost of the item. Jody can subcontract finished samplers but this costs four times the unit cost of each sampler.

Item Master File

| Item | On Hand | Lead Time | Lot Size | Unit Cost | Scheduled Receipts |
|--------------------------|---------|-----------|----------|-----------|--------------------|
| Northwest Grunge Sampler | 37 | 2 | 1 | \$6.00 | 0 |
| Deep South Hooch Sampler | 5 | 1 | 1 | \$6.00 | 0 |
| Walla Walla Mud | 340 | 1 | 10 | \$1.00 | 0 |
| Mt. Hood Dredge | 201 | 2 | 75 | \$1.00 | 0 |
| Tacoma Terror | 250 | 1 | 40 | \$0.50 | 0 |
| Tuscaloosa Tornado | 35 | 1 | 1 | \$0.50 | 0 |
| Meridian | 150 | 2 | 20 | \$0.50 | 0 |

Purchasing and Materials Management Exam II

| | | | | | |
|----------------------|-----|---|-----|--------|---|
| Mothball | | | | | |
| Augusta Augsbarge | 5 | 1 | 40 | \$0.50 | 0 |
| Labels | 257 | 2 | 100 | \$0.01 | 0 |
| Boxes | 611 | 2 | 91 | \$0.10 | 0 |

Finance has asked for a preliminary report on how much capital will be needed to purchase the units needed to complete these orders. Using the MRP matrices and the notes provided, calculate the capital costs per week and total for the quarter associated with the schedule you have constructed. Capital costs are equal to the unit cost of the item. Inventory holding costs are approximately the same for each item and run about \$0.40 per week. Jody also needs to estimate the costs incurred from holding inventory per week and over the entire quarter.

Scheduling Dilemma

Jody wasn't quite finished even after she figured out the MRP, capacity, and cost issues. The shop floor scheduler had just come back from a two-week vacation and wanted to know why Jody had scheduled the loading/packaging machine in the manner she did. He had left a timetable of what needed to be completed and a note stating to process the jobs first come first served. The following table contains the respective times (in minutes) to complete each job in each work center.

| <u>Job/Time</u> | <u>Work Center 1</u> Load Item | <u>Work Center 2</u> Pour in Foam Peanuts & Shake Box to Settle | <u>Work Center 3</u> Fill out Warranty Pamphlet &/or Warranty Card, &/or Bill of Lading |
|------------------|-----------------------------------|---|---|
| South 24th | 22 | 21 | 17 |
| College Drive | 15 | 2 | 6 |
| Fontenelle Blvd. | 112 | 61 | 13 |
| Elm Drive | 11 | 11 | 7 |
| Grant Street | 34 | 10 | 18 |
| River Road | 57 | 12 | 11 |
| Jackson Street | 7 | 3 | 21 |
| Nebraska Street | 54 | 43 | 28 |

Jody used the scheduling technique called Johnson's Rule to produce a more efficient sequence of jobs. However, she must show the shop floor scheduler that her schedule is truly more efficient (i.e., shorter makespan and less idle time). Help Jody create an APP an MPS and an MRP, manage her capacity, reply to Finance and Accounting, and illustrate (HINT: Gantt Chart) to her boss that his method of sequencing the jobs may not be the most efficient.