K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH,
Vidyavihar, Mumbai- 400077
Program: *PG/MMS Ops (Batch 2016-18) Trim-IV*
Subject: Business Process Flows
(End Term Examination) (In computer lab)

Maximum Marks: 50 **11th Sep, 2017** **Duration: 3 hours**

Instructions

- **Write all your answers in the answer sheet clearly. Your submission in answer sheet will be primarily used for evaluation, supported by the excel submission.**
- **Use Excel and solver as required and keep saving your work (one single file with reference of your program and roll no) as you proceed. Follow the instructions of data centre personnel and transfer your folder to an appropriate place in the server.**
- **If you assume any data not given, please provide suitable explanation of the same.**

Part A – Problems (Answer any 3 out of 5: 3X11=33 marks)

1.
   a. A bank finds that the average number of people waiting in line during lunch hour is 10. On average, during this period, 2 people per minute leave the bank after receiving service. On average, how long do bank customers wait in line?
   b. A home insurance application consists of two forms: F1, which relates to the home owner, and F2, which relates to the property. On receipt, each application is processed, recorded, and separated into F1 and F2. This operation is done by the data-entry clerk and requires 10 minutes. F1 is processed by professional A for 15 minutes per unit and then by professional B for 10 minutes per unit. F2 is processed by professional C for 20 minutes per unit.F1 and F2 are then combined and further processed by a loan officer for 15 minutes.
      i. Draw a process flow chart for the process.
      ii. What is the theoretical flow time?
      iii. The average flow time of an application is 7 working days. Assuming 480 minutes per day, compute the flow-time efficiency of the process.

2. The Traffic Court of King James County operates between the hours of 9:00 a.m. and 1:00 p.m. each morning, at roughly 9:00, 200 defendants show up for trial involving traffic violations such as speeding, illegal parking, and ignoring a stop sign. On a typical day, a sample of 10 defendants was selected at random by a consultant. For each defendant, the consultant recorded the actual time spent in discussion with the judge and the time paying the fine (not including the waiting). Also recorded were the times the defendant arrived and left the court. The data are provided in the following table:

Defendant	Arrival	Departure	Time with the Judge (minutes)	Time paying fine (minutes)
1	8:45	9:30	1	5
2	8:45	9:45	1.5	2
3	8:45	12:05	2	3
4	8:50	12:55	1.5	5

5	8:50	10:35	1	2
6	8:55	9:20	1	0
7	8:55	11:35	2	2
8	9:00	10:45	3	0
9	9:00	12:55	1	2
10	9:00	9:20	1.5	3

a. Estimate the average theoretical flow time of the process.
b. Estimate the average flow time of the process.
c. What is the flow-time efficiency?

3. Three hairstylists, Francois, Bernard, and Mimi, run Fast Service hair Salon for busy professionals in the Gold Coast area of downtown Chicago. They stay open from 6:45 a.m. to 9:00 p.m. in order to accommodate as many people's work schedules as possible. They perform only shampooing and hairstyling activities. On average, it takes 10 minutes to shampoo, 15 minutes to style the hair, and 5 minutes to bill the customer. When a customer arrives, he or she first checks with the receptionist (Lulu). This takes 3 minutes. One of the stylists takes charge of customer and performs all three activities- shampooing, styling, and billing- consecutively.
   a. Draw the process flow chart.
   b. What is the number of customers that can be serviced per hour in this hair salon?
   c. A customer of Fast Service Salon, an operations specialist, has suggested that the billing operation be transferred to Lulu. What would be the impact on the theoretical capacity?

4. Victor sells a line of upscale evening dresses in his boutique. He charges $ 300 per dress, and sales averages 30 dresses per week. Currently, Victor orders a 10-week supply at a time from the manufacturer. He pays $ 150 per dress, and it takes two weeks to receive each delivery. Victor estimates his administrative cost of placing the order at $225. He estimates his inventory cost at a cost of capital of 20 %.
   a. Compute Victor's total annual cost of ordering and carrying inventory.
   b. If he wishes to minimize his annual cost, when and how much should Victor order in each batch? What will be his annual cost?
   c. Compare the number of inventory turns under the current and proposed policies.

5. MassPC Inc. produces a 4-week supply of its PC Pal model when stock on hand drops to 500 units. (It takes one week to produce a batch.) Factory orders average 400 units per week, and standard deviation of forecast errors is estimated at 125 units.
   a. What level of customer service is MassPC providing to its distributors in terms of stock availability?
   b. MassPC wants to improve customer service to 80 %, 90%,95%, and 99%. How will such improvements affect the company's reorder policy and its annual costs?

PART B – Case Analysis (Answer any one out of two:1X 17 = 17 marks)

6. Hi-tek is a retailer of computer equipment in the greater Chicago region with four retail outlets. Currently, each outlet manages its ordering independently. Demand at each retail outlet averages 4000 units per week. Each unit costs $ 200, and Hi-tek has an annual holding cost of 20 %. The fixed cost of each order (administrative + transportation) is $ 900. Assume 50 weeks in a year.
   a. Given that each outlet orders independently and gets its own delivery, determine the optimal order size at each outlet.
   b. On average, how long (in weeks) does each unit spend in the Hi-tek system before being sold?
   c. Hi-tek is thinking of centralizing purchasing (for all four outlets). In this setting, Hi-tek will place a single order (for all outlets) with the supplier. The supplier will deliver the order on a common truck to a transit point. Since individual requirements are identical across outlets, the total order is split equally and shipped to the retailers from this transit point. This entire operation will increase the fixed cost of placing an order to $ 1800. If Hi-tek manages ordering optimally, determine the average inventory across outlets in the new Hi-tek system.

7. Orange Juice Inc. produces and markets fruit juice. During the orange harvest season, trucks bring orange from the fields to the processing plant during a workday that runs from 7 a.m. to 6 p.m. On peak days, approximately 10000 kilograms of oranges are trucked in per hour. Trucks dump their contents in a holding bin with a storage capacity of 6000 kilograms. When the bin is full, incoming trucks must wait until it has sufficient available space. A conveyor moves oranges from the bin to the processing plant. The plant is configured to deal with an average harvesting day, and maximum throughput (flow rate) is 8000 kilograms per hour.
   a. Assuming that oranges arrive continuously over time, construct an inventory buildup diagram for the company.
   b. In order to process all the oranges delivered during the day, how long must the plant operate on peak days?(assume that it cannot store oranges since the company makes fresh juices.)
   c. Assuming that each truck holds about 1000 kilograms of oranges, at what point during the day must a truck wait before unloading into the storage bin?
   d. What is the maximum time that a truck must wait?
   e. How long will trucks wait on average?
   f. Among trucks that do wait, how long is the average wait?

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