VPM's
DR VN BRIMS, Thane
Programme: MMS (2021-23)
Third Semester Regular Examination February 2023

Course Name: Operation Analytics		**Course Code**	MMS - O - 305
Roll No.		**Marks**	**60**
Total No.	6	**Duration**	**3 Hours**
Total No. of printed pages	4	**Date**	**09-02-2023**

Course Outcome Statements:
CO1: Relate the present Computing system implemented in large organizations for the collection of operational data.
CO2: Classify the types of Operational Analytics and their usages in today's businesses.
CO3: Apply Advanced Excel for decision-making in demand forecasting.
CO4: Examine service analytics business-focused problems using Excel's Solver.
CO5: Interpret Operation Analytics Solutions on Transportation, Inventory decisions and Queuing model problems.

Instructions: - For Question no 1, 3 and 4 use a dataset available in folder OA-FE. Before analysing the data, create a new worksheet for data analysis and save the file before closing the excel workbook.

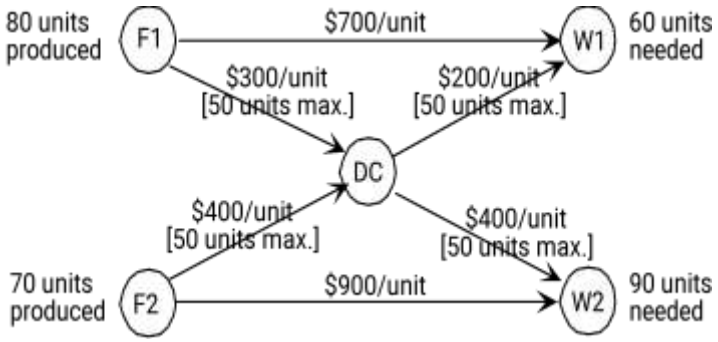
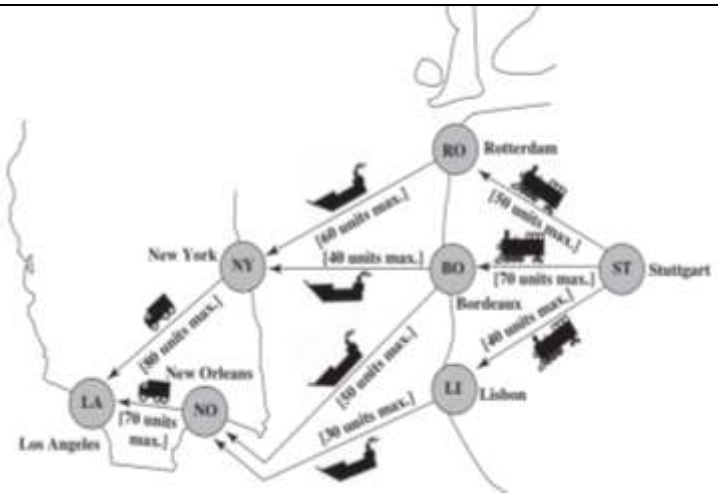
For Qn2 a and b, use QM for Windows and save the screenshot of findings in the same folder.

Interpretation/ Conclusion / Recommendation should be mentioned in the Answer sheet after data analysis.

Q. No (All Questions are Compulsory)

Q. No.		Questions	Marks	BL	CO
Q. 1		Case/Case-let Study (500-800 words)			
	a.	The company is preparing to introduce two new products: • An 8-foot glass door with aluminum framing. • A 4-foot X 6-foot double-hung wood-framed window. To analyze which mix of the two products would be most profitable, the company's Management Science Group introduced two decision variables: D= Production rate of this new kind of door and W=Production rate of this new kind of window. where this rate measures the number of units produced per week. Three plants will be involved in the production of these products. Based on managerial decisions regarding how much these plants will continue to be used to produce current products, the number of hours of production time per week being made available in Plants 1, 2, and 3 for the new products is 4, 12, and 18, respectively. After obtaining rough estimates that the profit per unit will be $300 for the doors and $500 for the windows.The objective is to choose the values of D and W so as to maximize the total profit. Applying Solver to this model find the optimal solution using datasheet Q1a and conclude the findings in Answer sheet.	**6**	**Level 4**	**CO4**

	b.	I work for a manufacturer that sells microchips globally. I'm given monthly actual and predicted sales for Canada, France, and the United States for Chip 1, Chip 2, and Chip 3. I'm also given the variance, or difference, between actual and budgeted revenues. For each month and each combination of country and product, l'd like to display the following data: actual revenue, budgeted revenue, actual variance, actual revenue as a percentage of annual revenue and variance as a percentage of budgeted revenue. **How can I display this information?** Solve the above case using dataset Q1b and interpret the results on your answer sheet.	**6**	**Level 5**	**CO5**
Q. 2		Answer **Any one** from the following.			
	a.	The Friendly Neighbor Grocery Store has a single check- out stand with a full-time cashier. Customers arrive randomly at the stand at a mean rate of 30 per hour. The service-time distribution is exponential, with a mean of 1.5 minutes. This situation has resulted in occasional long lines and complaints from customers. Therefore, because there is no room for a second checkout stand, the manager is considering the alternative of hiring another person to help the cashier by bagging the groceries. This help would reduce the expected time required to process a customer to 1 minute, but the distribution still would be exponential. The manager would like to have the percentage of time that there are more than two customers at the checkout stand down below 25 percent. She also would like to have no more than 5 percent of the customers needing to wait at least 5 minutes before beginning service, or at least 7 minutes before finishing service. What is the probability of having more than two customers at the check- out stand? Also, find the probability that the waiting time before beginning service exceeds five minutes, and the probability that the waiting time before finishing service exceeds seven minutes Solve the above case using QM for windows using dataset Q2a and recommend your decision with appropriate justification.	**6**	**Level 5**	**CO5**
	b.	For the case mentioned in Q2a, Use the formulas for the M/M/ 1 model to calculate L, W, Wq , Lq , P0, P1 and P2 for the current mode of operation. Solve the above case using QM for windows using dataset Q2b. Determine the values and conclude.	**6**	**Level 5**	**CO5**

Q. 3		Answer **Any one** from the following.			
	a.	 The Distribution Unlimited Co. has two factories producing a product that needs to be shipped to two warehouses • Factory 1 produces 80 units. • Factory 2 produces 70 units. • Warehouse 1 needs 60 units. • Warehouse 2 needs 90 units. There are rail links directly from Factory 1 to Warehouse 1 and Factory 2 to Warehouse 2. Independent truckers are available to ship up to 50 units from each factory to the distribution center, and then 50 units from the distribution center to each warehouse. **Analyze and conclude how many units (truckloads) should be shipped along each shipping lane?** Solve the above case using dataset Q3a.	**6**	**Level 4**	**CO4**
	b.	 Karl needs to execute a plan quickly for shipping as much as possible from the main factory to the distribution center in Los Angeles over the next month. He already has recognized that this is a *maximum flow problem*—a problem of maximizing the flow of replacement parts from the factory to this distribution center. The factory is producing far more than can be shipped to this one distribution center. Therefore, the limiting factor on how	**6**	**Level 4**	**CO4**

		much can be shipped is the limited capacity of the company's distribution network. This distribution network is depicted in Figure, where the nodes labeled ST and LA are the factory in Stuttgart and the distribution center in Los Angeles, respectively. There is a rail head at the factory, so shipments first go by rail to one of three European ports: Rotterdam (node RO), Bordeaux (node BO), and Lisbon (node LI). They then go by ship to ports in the United States, either New York (node NY) or New Orleans (node NO). Finally, they are shipped by truck from these ports to the distribution center in Los Angeles. The organizations operating these railroads, ships, and trucks are independently owned companies that ship goods for numerous firms. Because of prior commitments to their regular customers, these companies are unable to drastically increase the allocation of space to any single customer on short notice. Therefore, the BMZ Co. is only able to secure a limited amount of shipping space along each shipping lane over the next month. The amounts available are given in Figure, using units of *hundreds of cubic meters.* (Since each unit of 100 cubic meters is a little over 3,500 cubic feet, these are large volumes of goods that need to be moved.) **Analyze and conclude how many units should be sent through each shipping lane to maximize the total units flowing from Stuttgart to Los Angeles?**			
Q. 4		Answer **Any two** from the following.			
	a.	Develop a dashboard on Excel using the data set Q4a.	**6**	**Level 3**	**CO3**
	b.	Summarize the data given in dataset Q4b by making use of Pivot table.	**6**	**Level 3**	**CO3**
	c.	Make use of 'Report Layout' to display the data given in dataset Q4c in three different forms.	**6**	**Level 3**	**CO3**
Q. 5		Answer **Any two** from the following.			
	a.	Explain 'The Moving- average Forecasting Method' and 'The Exponential smoothing forecasting Method' with examples.	**6**	**Level 2**	**CO2**
	b.	Explain MAD and MAPE with examples.	**6**	**Level 2**	**CO2**
	c.	Illustrate M/M/1 Queuing Model with example.	**6**	**Level 2**	**CO2**
Q. 6		Answer **Any two** from the following.			
	a.	What are the types of Operation Analytics and explain its application in E-commerce with example.	**6**	**Level 1**	**CO1**
	b.	Which steps are included in the Data Driven Decision-Making Flow Diagram?	**6**	**Level 1**	**CO1**
	c.	What are the types of Data measurement Scale?	**6**	**Level 1**	**CO1**