Year	Month	Time Period	CPI
2015	1	1	134.6
	2	2	134.8
	3	3	135.0
	4	4	135.2
	5	5	135.6
	6	6	136.0
	7	7	136.2
	8	8	136.6
	9	9	137.2
	10	10	137.4
	11	11	137.8
	12	12	137.9
2016	1	13	138.1
	2	14	138.6
	3	15	139.3
	4	16	139.5
	5	17	139.7
	6	18	140.2
	7	19	140.5
	8	20	140.9
	9	21	141.3
	10	22	141.8
	11	23	142.0
	12	24	141.9
2017	1	25	142.6
	2	26	143.1
	3	27	143.6
	4	28	144.0
	5	29	144.2
	6	30	144.4
	7	31	144.4
	8	32	144.8
	9	33	145.1
	10	34	145.7
	11	35	145.8
	12	36	145.8

Trimester: Jan - April 2024 Examination: End term Examination		
Program code: 17 **Program: PGDM EXE**	**Class: SY**	**Semester: III** **(SVU 2022)**
Name of the Constituent College: **K. J. Somaiya Institute of Management**	**Name of the department/Section/Center: Business Analytics**	
Course Code: 117P17C301	**Name of the Course: Business Analytics**	

Maximum Marks: 25 **Date: 22/4/2024**
Duration: 1.5 hrs

Instructions:-

1. **The question paper consists of 2 sections – Section A (13 Marks) & B (12 Marks).**
2. **Make 1 Excel file for each section with different worksheets pertaining to each question.**
3. **Attempt all questions in Section A**
4. **Attempt any TWO questions in Section B.**
5. **Make suitable assumptions if required and state them.**
6. **Name the files as Name_ Section A/B_SVU Roll no.**

Question No.		Max. Marks
	Section A	
Q 1	Tarrows, Pearson, Foster, and Zuligar (TPF&Z) stands as one of the leading actuarial consulting firms in the U.S., offering specialized advice in executive and employee benefits programs, along with assisting companies in determining annual contributions to defined benefit retirement plans. Companies typically provide two retirement plan types: defined contribution plans, where a fixed percentage of an employee's earnings is set aside for retirement, and defined benefit plans, which promise a retirement benefit based on a percentage of the employee's final or peak earnings, obligating the company to ensure sufficient funding for future retiree benefits. TPF&Z plays a critical role in helping companies calculate these necessary reserves, especially for plans incorporating cost of living adjustments (COLAs) tied to the Consumer Price Index (CPI). Given that the CPI reflects the cost of a standard basket of goods and is a primary measure for adjusting retirees' benefits, accurate CPI forecasts are vital. TPF&Z's forecasting accuracy has significant implications, as minor discrepancies can lead to substantial financial shifts, affecting millions in corporate pension reserves and, by extension, the	[1+ 2+2+2 =7]

	company's bottom line. Hence, the precision of TPF&Z's CPI projections is paramount, not just for compliance but for the financial health and strategic planning of their clients. **a)** Prepare a plot of the CPI data and identify the components of the time series. **[Data File: CPI Data]** b) Apply Exponential smoothing method and use Solver to find the value of α (alpha) that minimize the Mean Square Error (MSE) between the actual and predicted CPI values. What is the forecasted CPI value for January 2018 using this technique? c) Apply Trend Projection Method and calculate Mean Square Error. What is the forecasted CPI value for January 2018 using this technique? d) Which forecasting technique outperforms the others? Provide a justification for your selection.	
Q 2	Grear Tire Company has produced a new tire with an estimated mean lifetime mileage of 36,500 miles. Management also believes that the standard deviation is 5000 miles and that tire mileage is normally distributed. Use a worksheet to simulate the miles obtained for a sample of 500 tires. a. Use the excel countif function to determine the number of tires that last longer than 40,000 miles. What is your estimate of the percentage of tires that will exceed 40,000 miles? b. Use Countif to find the number of tires that obtain mileage less than 32,000 miles. Then, find the number with less than 30,000 miles and the number with less than 28,000 miles. c. If management would like to advertise a tire mileage guarantee such that approximately no more than 10% of the tires would obtain mileage low enough to qualify for the guarantee, what tire mileage considered in part (b) would you recommend for the guarantee?	[2+2+2 = 6]
	Section B	
Q 1	A manufacturing firm produces diesel engines in four cities—Phoenix, Seattle, St. Louis, and Detroit. Three trucking firms purchase these engines for their plants in 3 cities. The production capacity of the manufacturing firm and the requirements of the three trucking firms are given in the tables below: **Manufacturing Plant** / **Production** Phoenix 5 Seattle 25 St. Louis 20 Detroit 25 **Trucking Firm** / **Demand** Greensboro 10 Charlotte 20 Louisville 15 The transportation costs per engine (in hundreds of dollars) from sources to destinations are shown in the following table. However, the Charlotte firm will	6

not accept engines made in Seattle, and the Louisville firm will not accept engines from Detroit.

From	To (cost in $100)		
	Greensboro	Charlotte	Louisville
Phoenix	7	8	5
Seattle	6	--	6
St. Louis	10	4	5
Detroit	3	9	--

Solve the above problem to minimize the overall transportation cost.

Q 2

Three cargo ships will be used for shipping goods from one port to four other ports (labeled P1, P2, P3, P4). Any ship can be used to make any one of these four trips. However, because of differences in the ships and cargoes, the total cost (in INR) of loading, transporting, and unloading the goods for the different ship-port combinations varies considerably, as shown in the following table:

Port / Ship	P1	P2	P3	P4
1	500	400	600	700
2	600	600	700	500
3	700	500	700	600

The penalty costs for not satisfying demand at ports P1, P2, P3 and P4 are Rs. 500, 400, 600 and 600, respectively. Determine the minimum-cost assignment for this problem. What is the total cost for the optimal assignment? Which port remains unassigned?

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Q 3

Crimp Paper Mills, Inc. operates paper plants in Augusta, Dallas, and Tupper Lake. Warehouse facilities are in Albany and Portsmouth, New Hampshire. Distributors are in Boston, New York, and Philadelphia. The plant capacities and distributor demand for the next month are as follows:

Plant	Supply
Augusta	100
Dallas	200
Tupper Lake	200

Distributor	Demand
Boston	50
New York	150
Philadelphia	300

The unit transportation costs (in dollars) for shipments from the three plants to the two warehouses and from the two warehouses to the three distributors are as follows:

Units Shipping Costs from Manufacturing Plants to Warehouses

From / To	Albany	Portsmouth
Augusta	3	2
Dallas	4	3
Tupper Lake	2.5	3.5

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Units Shipping Costs from Warehouses to

To From	Boston	New York	Philadelphia
Albany	2	1	4
Portsmouth	3	2	5

Determine the minimum cost shipping schedule for the problem.