Course Name:	Operation Analytics	Course Code	O - 305
Roll No.		Marks	60
Total No. of Questions	6	Duration	3 Hours
Total No. of printed pages	4	Date	1/2/2024

Course Outcome Statements:

CO1: <u>Relate</u> the present Computing system implemented in large organizations for collection of operational data.

CO2: <u>Classify</u> the types of Operational Analytics and their usages in today's businesses.

CO3: <u>Apply</u> Advanced Excel for decision making in demand forecasting.

CO4: <u>Examine</u> service analytics business focused problems using Excel's Solver.

CO5: <u>Interpret</u> Operation Analytics Solutions on Transportation, Inventory decisions and Queuing model problems.

Instructions: -			Marks	BL	CO
Q. No 1 (All Questions are Compulsory)					
Q. No.		Questions			
Q. 1		Caselet			
		In an 11-month endeavour, a group of entrepreneurs identified and capitalized on a lucrative market opportunity through meticulous demand analysis. The journey began with a modest production of 100 units, and their strategic emphasis on operational efficiency yielded impressive results. By the second month, production saw a remarkable 50% increase, setting the stage for continued growth. By the eleventh month, their efforts culminated in an outstanding production output of 350 units.			
		Operational efficiency emerged as a cornerstone of their success, allowing the team to respond swiftly and effectively to market demands. This strategic focus not only met the escalating needs of the market but also showcased the team's adept management of internal processes, ensuring scalability and adaptability.			
		This entrepreneurial journey exemplifies how a targeted operational strategy, cantered on efficiency and responsiveness, can lead to significant achievements. The team's ability to rapidly scale production while maintaining quality positions them for sustained success in the competitive market landscape.			

Month	Demand
1	100
2	150
3	225
4	240
5	170
6	280
7	300
8	300
9	320
10	330
11	350

	a.	Using 5-month moving average **examine** the forecast values.	6	Level 4	CO4
	b.	**Determine** MAD, MSE & MAPE for the above case.	6	Level 5	CO5
Q. 2		Answer **Any one** from the following.			
	a.	**Explain** how, in the context of a tech start-up focused on implementing a new product development strategy, the Kaplan and Norton Balanced Scorecard can be strategically employed. Justify its application by detailing how this framework goes beyond traditional financial metrics.	6	Level 5	CO5
	b.	**Compare** descriptive analytics and predictive analytics in providing insights for business decision-making.	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. | 6 | Level 4 | CO4 |

		Factory 2 produces 70 units. Warehouse 1 needs 60 units. Warehouse 2 needs 90 units. The number on top of each arrow shows the unit shipping cost along that shipping lane. 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** the given data and **conclude** how units (truckloads) should be shipped along each shipping lane?			
	b.	Below is Summary Report on Manufacturing Operations **Production Output:** Monthly production output (units): January: 10,000 units February: 11,500 units March: 12,200 units **Defect Rate:** Defective units identified during quality checks: January: 150 units (1.5% of total production) February: 120 units (1.04% of total production) March: 100 units (0.82% of total production) **Downtime Analysis:** Total downtime hours due to maintenance or technical issues: January: 50 hours February: 40 hours March: 35 hours **Employee Productivity:** Average units produced per employee per hour: January: 12 units February: 13 units March: 14 units **Supply Chain Lead Time:** Average lead time for raw material delivery: January: 7 days February: 6 days March: 5 days Question for Analysis: Based on the provided data, **analyze** the manufacturing efficiency metrics and identify trends or insights that can inform strategies for improving overall operational efficiency. Consider the relationship between production output, defect rates, downtime, employee productivity, and supply chain lead time.	6	Level 4	CO4
Q. 4		Answer **Any two** from the following.			

	a.	**Make use of** the M/M/1 queuing model concept to design and analyze a scenario where customers arrive at a single-server system.	6	Level 3	CO3
	b.	**Build** a customer feedback model in the retail sector using survey techniques. How would you utilize this model to identify areas for improvement and enhance customer satisfaction?	6	Level 3	CO3
	c.	**Construct** a comprehensive set of KPIs for an e-commerce platform to increasing conversion rates and customer engagement.	6	Level 3	CO3
Q. 5		Answer **Any two** from the following.			
	a.	**Explain** how the utilization of simulation techniques contributes to enhancing customer service efficiency.	6	Level 2	CO2
	b.	**Illustrate** how operational analytics is applied in real-world scenarios to optimize business processes and enhance decision-making.	6	Level 2	CO2
	c.	**Explain** regression adjusted with seasonality concept.	6	Level 2	CO2
Q. 6		Answer **Any two** from the following.			
	a.	**How** is service analytics applied in the retail sector?	6	Level 1	CO1
	b.	**What** are some common methods used for forecasting in business?	6	Level 1	CO1
	c.	**Why** is the implementation of Supply Chain Analytics crucial for businesses?	6	Level 1	CO1