Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV/DEC 2024

MANUFACTURING ENGINEERING

Seventh Semester

MF5701 MANUFACTURING MANAGEMENT SYSTEMS

(Regulation 2019)

Time:3 hrs

Max. Marks: 100

CO1	Understand the fundamental concepts, types of production systems, and functions of production planning and control, alongside recognizing the challenges within these systems.
CO2	Assess the effectiveness of forecasting systems, analyzing their design, logic, and methods to determine their suitability for different manufacturing scenarios.
CO3	Dissect the material requirement planning (MRP) system, evaluating inputs, logic, and planning approaches to optimize resource allocation and capacity planning.
CO4	Apply computer-aided process planning approaches to create efficient manufacturing processes, utilizing CAD models, artificial intelligence, and databases for decision-making.
CO5	Design effective shop floor control strategies integrating order release, scheduling, and progress monitoring techniques to optimize manufacturing operations.

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)

(Answer all Questions)

Q. No.	Questions	Marks	CO	BL
1	Why is flexibility important in an MPC system?	2	CO1	L2
2	What does Collaborative Planning, Forecasting, and Replenishment (CPFR) aim to improve?	2	CO1	L2
3	Define Forecasting.	2	CO2	L1
4	What is seasonal demand in forecasting?	2	CO2	L2
5	What are the two types of inventory review systems?	2	CO3	L1
6	Explain the difference between independent and dependent demand.	2	CO3	L2
7	Why is forward planning used in CAPP?	2	CO4	L2
8	What is a key weakness of production flow analysis (PFA)?	2	CO4	L2
9	What does job sequencing mean in production scheduling?	2	CO5	L2
10	Define "real-time monitoring" in shop floor data collection.	2	CO5	L1

PART- B (5x 13=65Marks)

<table>
<tr><th>Q. No.</th><th>Questions</th><th>Marks</th><th>CO</th><th>BL</th></tr>
<tr><td>11 (a)</td><td>Compare and contrast the four types of production systems: make-to-stock, assemble-to-order, make-to-order, and engineer-to-order. Discuss their advantages and disadvantages in terms of flexibility, lead time, and inventory management.</td><td>13</td><td>CO1</td><td>L4</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>11 (b)</td><td>Analyze the problems associated with traditional production planning and control in a manufacturing environment. Discuss how these issues can affect overall productivity and customer satisfaction.</td><td>13</td><td>CO1</td><td>L4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12 (a)</td><td>The demand for electric motors during the last 10 weeks has been 35, 40, 38, 50, 42, 44, 56, 52, 48, and 50. Make the forecast for the 11th week by each of the following methods.
i)Three period moving average
ii)Three period moving average with weights attached to the past demands such that the recent demand is weighted three times as heavily as each of the preceding demands.
Comment on accuracy of prediction of above methods.</td><td>13</td><td>CO2</td><td>L3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>12 (b)</td><td>The demand for a particular product during the last 10 quarters is given below:
<table>
<tr><th>Quarter</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th></tr>
<tr><td>Demand</td><td>40</td><td>50</td><td>45</td><td>55</td><td>57</td><td>60</td><td>58</td><td>62</td><td>60</td><td>65</td></tr>
</table>
i. Three period moving average
ii. Use exponential smoothing to forecast the demand for quarters 11. Use α = 0.3. Assume initial base as 40.00.
Comment on accuracy of prediction of above methods.</td><td>13</td><td>CO2</td><td>L3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13 (a)</td><td>A company has the following weekly net requirements for 12 weeks:
<table>
<tr><th>Week</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th></tr>
<tr><td>Net Requirements</td><td>60</td><td>110</td><td>140</td><td>90</td><td>160</td><td>120</td><td>100</td><td>85</td><td>70</td><td>60</td><td>50</td><td>45</td></tr>
</table>
The cost per item is Rs. 800, the order or setup cost is Rs. 4000, and the inventory carrying cost per week is 0.6% of the unit cost, which applies to each unit held in inventory at the end of a week.
i. Use the Least Total Cost (LTC) method to determine the lot sizes for the scheduling period.</td><td>13</td><td>CO3</td><td>L3</td></tr>
</table>

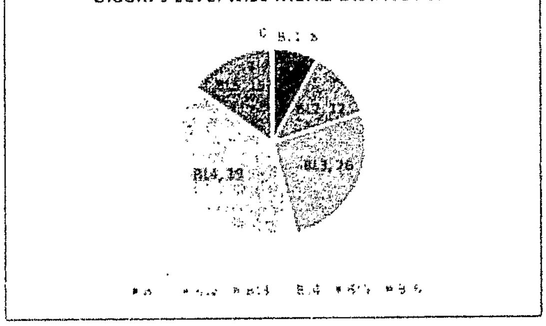
	ii. Evaluate the total cost of the selected schedule			
	OR			
13 (b)	A product P is manufactured using 3 units of Q and 2 units of R. Each Q requires 4 units of S and 2 units of T, while each R requires 3 units of S and 5 units of U. The lead times for purchasing or fabricating the components are as follows: P (1 week), Q (2 weeks), R (2 weeks), S (1 week), T (1 week), and U (1 week). There is a requirement of 120 units of P in Week 12, which includes 100 firm orders and 20 forecasted demand. Assume there is no initial inventory for any item. (a) Create a bill of materials (BOM) with an indented and summarized part list for product P. (b) Develop an MRP schedule that includes gross requirements, net requirements, order releases, and order receipts for all components.	13	CO3	L3
14 (a)	Analyze how knowledge representation techniques, such as frames, influence data organization in Computer-Aided Process Planning (CAPP). Evaluate their strengths and limitations in improving data structure and accessibility.	13	CO4	L4
	OR			
14 (b)	Examine the challenges of feature recognition in CAD models for process planning. Analyze how these challenges affect the accuracy and efficiency of process planning, and identify potential strategies to mitigate these issues.	13	CO4	L4
15 (a)	Analyze the differences between cloud-based data collection platforms and on-premises solutions for shop floor monitoring. What are the implications of these differences for data security, scalability, and operational efficiency?	13	CO5	L4
	OR			
15 (b)	Break down the concept of shop floor control (SFC) into its key components. Analyze how each component contributes to its overall role in manufacturing, and identify the challenges associated with implementing SFC effectively. Propose strategies to overcome these challenges.	13	CO5	L4

PART- C (1x 15=15Marks)

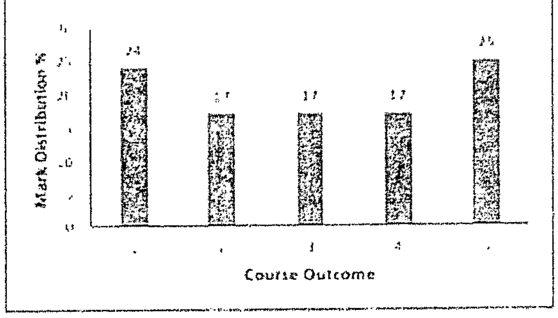
Q. No.	Questions	Marks	CO	BL
16.(i)	Evaluate how Industrial IoT could transform predictive analytics in a high-volume manufacturing environment.	8	CO5	L5

16 (ii)	Evaluate how Collaborative Planning, Forecasting, and Replenishment (CPFR) transform traditional demand forecasting approaches	7	CO1	[redacted]

Question	Marks/CO					Total	Marks/BL					
	CO1	CO2	CO3	CO4	CO5	Marks	BL1	BL2	BL3	BL4	BL5	BL6
1	2					2		2				
2	2					2		2				
3		2				2	2					
4		2				2		2				
5			2			2	2					
6			2			2		2				
7				2		2		2				
8				2		2	2					
9					2	2		2				
10					2	2	2					
11	13					13						
12		13				13				13		
13			13			13			13			
14				13		13			13			
15					13	13				13		
16	7				8	15				13	15	
						Total	8	12	26	39	15	0
Mark Distribution	24	17	17	17	25	100	20		65		15	



Bloom's Level wise Marks Distribution



Course Outcome Wise Marks Distribution