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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
 B.Tech Degree S7 (R,S) Examination November 2025 (2019 Scheme)

**Course Code: MET463****Course Name: OPERATIONS MANAGEMENT****Max. Marks: 100****Duration: 3 Hours****PART A***Answer all questions, each carries 3 marks.***Marks**

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| 1 | Explain the significance of operations strategy in achieving organizational goals. | (3) |
| 2 | What are the differences between job shop production and mass production systems? | (3) |
| 3 | Differentiate between process layout and cellular layout. | (3) |
| 4 | What are the major objectives of facility layout planning? | (3) |
| 5 | Define forecast error and explain why it is important to measure forecast accuracy. | (3) |
| 6 | What factors influence the selection of an appropriate forecasting method? | (3) |
| 7 | Describe the purpose of a Bill of Materials in MRP. | (3) |
| 8 | Narrate the key benefits of aggregate planning. | (3) |
| 9 | What is the Shortest Processing Time (SPT) rule, and what objective does it achieve? | (3) |
| 10 | Explain the main assumptions made in a single machine scheduling problem. | (3) |

PART B*Answer any one full question from each module, each carries 14 marks.***Module I**

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|----|---|-----|
| 11 | a) Explain the system concept of production with a neat block diagram. How do inputs, processes, and outputs interact in this system? | (7) |
| | b) Explain the steps involved in Business Process Reengineering (BPR). How does BPR contribute to improving operational efficiency? | (7) |

OR

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| 12 | a) List any four factors affecting plant location. | (4) |
| | b) An engineering college is attempting to locate the best site for a new student center. The college administration would like to know what the best location is relative to the four main concentrations of student housing and classroom activity | (10) |

on campus. These coordinates of these housing and classroom areas (in yards) and daily student populations are shown as follows;

Campus Student Concentrations	Coordinates		Daily Student Population
	x	y	
A	1000	1250	7000
B	1500	2700	9000
C	2000	700	11500
D	32	25	4300

- i. Determine the best site using the center-of-gravity technique.
- ii. Plot the major concentrations of student housing and classroom activities on the grid map, and indicate the proposed location for the new student center.

Module II

- 13 a) Define capacity planning and explain the various capacity expansion strategies with a suitable sketch. (7)
- b) Describe the CRAFT algorithm used in facility layout design. Highlight its key features and applications. (7)

OR

- 14 Consider the following assembly network relationships of a product. (14)

Operations Number	1	2	3	4	5	6	7	8
Immediate Preceding Tasks	-	1	2	2	4	4, 5	2, 6	3, 7
Duration (min)	2	4	2	2	3	2	4	3

The number of shifts per day is one and the number of working hours per shift is 8. The company aims to produce 60 units of product per day. Group the activities into workstations using COMSOAL and compute balancing efficiency.

Module III

- 15 a) Describe the different types of demand patterns with suitable sketches. (7)
- b) Explain the linear regression method of forecasting. How is it used to estimate future demand? (7)

OR

- 16 A fertilizer company distributes fertilizer to various lawn and garden shops. The company must base its quarterly production schedule on a forecast of how many (14)

tons of fertilizer will be demanded from it. The company has gathered the following data for the past three years from its sales records

Quarter	1	2	3	4	5	6	7	8	9	10	11	12
Demand (ton)	105	150	93	121	140	170	105	150	150	170	110	130

- i. Compute a three-quarter moving average forecast for quarters 4 through 13.
- ii. Compute a weighted three-quarter moving average forecast using weights of 0.50, 0.33, and 0.17 for the most recent, next recent, and most distant data, respectively.
- iii. Compare the two forecasts using cumulative error. Which forecast appears to be more accurate?

Module IV

- 17 a) Explain the evolution from MRP to Manufacturing Resource Planning (MRP II). (7)
Highlight the major differences and advantages of MRP II.
- b) Describe the various pure aggregate planning strategies used by organizations to balance demand and capacity. (7)

OR

- 18 A Product has the following master production schedule (14)

Month	1	2	3	4	5	6
Projected Requirements	-	100	-	80	150	200

Each final product A is composed of subcomponents B and C. The Bill of Materials (BOM) and inventory status are given below;

Item	Number of Units Required	Initial Stock on Hand	Lead Time	Order Quantity
A	1	125	1	189
B	1	20	2	218
C	1	30	1	293

Develop the MRP tables for all items.

Module V

- 19 a) What is a Gantt chart? Explain how it is used for representing loading and scheduling activities with a neat sketch. (7)
- b) Consider the following single machine scheduling problem (7)

Job (j)	1	2	3	4	5	6
Processing Time (t_j) min	8	9	7	8	10	14
Due Date (d_j)	14	12	10	14	20	28

Determine the sequence which will minimize the maximum lateness. Also determine the maximum lateness with respect to the optimal sequence.

OR

- 20 Consider the following 2 machines and 6 jobs flow shop problem. (14)

Job (j)	Processing Time (t_j) min	
	Machine 1	Machine 2
1	5	7
2	10	8
3	8	13
4	9	7
5	6	11
6	12	10

Using Johnson's algorithm, obtain optimal sequence which will minimize the makespan and corresponding makespan.
