Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S7 (S, FE) Examinations May 2026 (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 |
|---|---|---|
| 1 | When performing a 'Make or Buy' analysis, what is a primary risk of choosing to 'Buy'? | (3) |
| 2 | What is meant by Business Process Reengineering and state its purpose. | (3) |
| 3 | Describe Process layout with a neat sketch. | (3) |
| 4 | What is the construction method in computerized facility layout planning? Give one example. | (3) |
| 5 | What are the limitations of demand forecasting? | (3) |
| 6 | What is damping factor in exponential smoothing? | (3) |
| 7 | What are the components of MRP System? | (3) |
| 8 | What is the Periodic Order Quantity method, and how is it used in inventory control? | (3) |
| 9 | Distinguish between job shop scheduling and flow shop scheduling. | (3) |
| 10 | Explain Palmer's Heuristic. | (3) |

## PART B

***Answer any one full question from each module, each carries 14 marks.***

### Module I

| | | |
|---|---|---|
| 11 | What are the objectives of operations management? How do operations interact with other functional areas for a firm? What are the different decision levels in operations management? | (14) |

**OR**

| | | |
|---|---|---|
| 12 | A healthcare organization is planning to establish a central medical supply warehouse to distribute medicines and equipment to nearby hospitals. The goal is to select the most suitable warehouse location that minimizes the load–distance value based on the number of supply shipments required by each hospital. | (14) |

The region has five hospitals, and their grid-map coordinates and annual number of supply truck deliveries are given below:

| Hospital | Coordinates | | Annual truck deliveries |
|---|---|---|---|
| | x | y | |
| 1 | 200 | 300 | 35 |
| 2 | 210 | 180 | 24 |
| 3 | 250 | 400 | 15 |
| 4 | 300 | 150 | 19 |
| 5 | 400 | 200 | 38 |

The healthcare organization is considering three possible sites for the new medical supply warehouse: Site A (350, 300), Site B (150, 250) and Site C (250, 300).

a) Using the Load–Distance method, determine the best location for the new medical supply warehouse.

b) Plot the five hospitals and the selected warehouse location on a grid map.

## Module II

13 a) What is CRAFT algorithm used for facility layout planning? Explain the steps involved in CRAFT. (7)

b) What is COMSOAL? Describe the procedure of the COMSOAL method used in line balancing. (7)

**OR**

14 A company is establishing an assembly line for a small home appliance. The plant plans to produce 300 units during an 8-hour shift. The following table shows the work elements, task times, and immediate predecessors involved in the assembly process. (14)

| Work element | Time (sec) | Immediate Predecessors |
|---|---|---|
| A | 40 | None |
| B | 60 | A |
| C | 50 | B |
| D | 35 | B |

| | | |
|---|---|---|
| E | 25 | D |
| F | 80 | A |
| G | 55 | F |
| H | 90 | G |
| I | 45 | C,H |
| J | 30 | E,I |

a) Determine the cycle time required for the assembly line.

b) Assign the work elements to workstations using the Longest Operational Time (LOT) method.

c) Calculate the line balancing efficiency of the assembly line.

**Module III**

15 a) Differentiate between qualitative and quantitative forecasting techniques with suitable examples. (7)

b) What is forecast accuracy? Explain the following measures of forecast accuracy: (7)
i) MAD ii) MSE

**OR**

16 A company recorded the following sales over the past nine years. Using the least squares method, estimate the sales forecast for the 10th year. Also calculate MAE and MSE for the sales data from 1 to $9^{th}$ year. (14)

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Sales (in lakhs) | 5 | 9 | 14 | 20 | 27 | 33 | 38 | 44 | 50 |

**Module IV**

17 Explain the concept, importance and scope of aggregate planning. Also discuss: (14)

(a) Pure strategies adopted in aggregate planning with suitable examples.

(b) Mixed strategy adopted in aggregate planning with suitable example.

**OR**

18 The Master Production Schedule (MPS) to manufacture Product X is shown below. (14)

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|

| Demand | 180 | NIL | 120 | 200 | 275 | 150 | NIL | 220 |
|---|---|---|---|---|---|---|---|---|

Each Product X requires one Component Y and one Component Z.

Each Component Z further requires Subcomponent P and Subcomponent Q.

The Bill of Materials (BOM) and inventory details are given below.

| Part | Order Quantity | Lead Time (weeks) | Inventory on Hand |
|---|---|---|---|
| Product X | 300 | 2 | 180 |
| Component Y | 400 | 1 | 350 |
| Component Z | 350 | 1 | 320 |
| Sub component P | 300 | 1 | 210 |
| Sub component Q | 350 | 2 | 380 |

Using the above information, prepare the Material Requirements Plan (MRP) for Product X, Component Y and Component Z for the 8-week planning horizon.

**Module V**

19 a) What is the purpose of sequencing? Explain any two methods used for sequencing jobs in a single-machine problem. (7)

b) Explain the steps and working of the McNaughton Algorithm, and also illustrate its application with a suitable example. (7)

**OR**

20 Consider the following flow shop scheduling problem. (14)

| Job (j) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Machine 1 | 9 | 3 | 14 | 6 | 10 |
| Machine 2 | 7 | 5 | 11 | 4 | 8 |

Using Johnson's algorithm:

(i) Determine the optimal job sequence that minimizes the makespan.

(ii) Also calculate the idle time on Machine 2.

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