

SCHEME & SOLUTIONS OF IAT-1

SUB: OPERATIONS MANAGEMENT

SEM: 8th SEM

SUBCODE: 10ME81

ACADEMIC YEAR: 2016-17

1. Definition: operations Mgt is defined as the design operation & Maintenance of the Transformation process which converts various inputs into outputs of desired products at fastest through put.

- 2 MARKS

Types of Production Systems

① Continuous Production system

- a) Mass Production or Flow prodn system.
- b) Process Production

② Intermittent Production system

- a) Job Production
- b) Batch production.

Explanation along with their Relative Merits & De-Merits 2 Marks Each
2x4=8 MARKS

② Estimated demand = 6,25,000 units

- a) Turning stage efficiency = $100 - 5 \Rightarrow 95\%$
Milling stage efficiency = $100 - 7 \Rightarrow 93\%$
Grinding stage efficiency = $100 - 9 \Rightarrow 91\%$

- 1 MARK

$$\text{over all stage efficiency} = \frac{(95 + 93 + 91)}{3} = 93\% \quad -1 \text{ MARK}$$

(b) Gross Time Available per day $60 \times 8 \Rightarrow 480 \text{ Min}$
Turning stage $- 1 + 3 = 3 \text{ MARKS}$

$$\text{Net Time Available in a day} = (\text{Gross Time} - \text{Avg down time} - \text{Avg daily set up time})$$

$$\Rightarrow 480 - 100 - 15$$

$$\Rightarrow 365 \text{ Min}$$

$$\text{Prodn Rate/day} = \frac{\text{Net Time Available}}{\text{Processing Time per unit}}$$

$$\Rightarrow \frac{365}{20} = 18.25 \text{ units per day}$$

Milling stage

$$\text{Net Time Available in a day} = 480 - 160 - 45 \Rightarrow 275 \text{ Min}$$

$$\text{Prodn Rate/day} = \frac{275}{30} \Rightarrow 9.16 \text{ units per day}$$

Grinding stage

$$\text{Net Time Available in a day} = 480 - 40 - 10 \Rightarrow 430 \text{ Min}$$

$$\text{Prodn Rate/day} = \frac{430}{50} \Rightarrow 8.6 \text{ units per day}$$

(c) $\text{No of M/c's required} = \frac{\text{Demand per Year}}{\text{Rate of Prodn per Year}} \quad 1 + 3 = 3 \text{ MARKS}$

$$\text{No. of Turning M/c's required} = \frac{6,25,000}{18.25 \times 5 \times 50} \Rightarrow 137 \text{ M/c's}$$

$$\text{No. of Milling M/c's Required} = \frac{625000}{9.16 + 5 + 50} \Rightarrow 273 \text{ M/c's}$$

$$\text{No. of Grinding M/c's Required} = \frac{625000}{8.6 + 5 + 50} \Rightarrow 2914 \text{ M/c's}$$

(d) Total Cost to Process all these M/c's

$$\begin{aligned} \text{Total cost} &\Rightarrow 137 + 2,00,000 + 273 + 3,00,000 + 2914 \times 200,000 \\ &= \underline{\underline{Rs 16.75 Crores}} \end{aligned}$$

- 2 MARKS

(3) Explanation of decision, decision making & decision methodology. - Each 1 Mark 1+3-3 Marks

Decision making Process:

1. Identify an existing Problem.
2. List possible alternatives for solving the problem.
3. Select the Most beneficial of these alternatives.
4. Implement the selected alternative.
5. Feed back.

- List & Explanation - 7 Marks

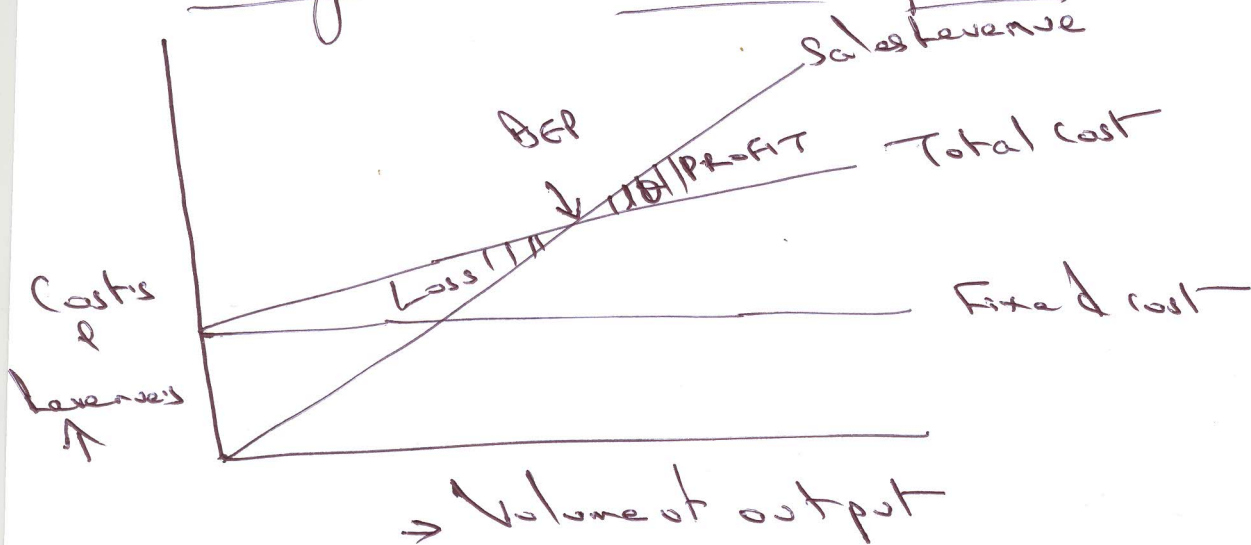
(4) Break even chart is a convenient way of graphically describing the relationship between costs, revenues & different volume of output.

- Explanation 2 Marks

- objectives 3 Marks

Analytical derivation of BEP

- 5 Marks



At BEP,

$$\text{Total cost} = \text{Total Sales Revenue.}$$

Let $F = \text{Fixed cost}$

$S = \text{Sales Revenue}$

$s = \text{s.p/unit}$

$V = \text{Variable cost/unit}$

$Q = \text{Qty Produced \& Sold.}$

$$(F + VQ) = SQ$$

$$Q_{\text{BEP}} = \frac{F}{s - V}$$

$$Q_{\text{BEP}} = \frac{\text{Fixed cost}}{\text{selling price per unit} - \text{variable cost per unit}}$$

$$\text{selling price per unit} - \text{variable cost per unit}$$

$$\textcircled{5} \quad F = \text{Rs } 16,000$$

$$Z = \text{Rs } 2,000$$

$$S = \text{Rs } 36,000$$

$$s = \text{Rs } 8/\text{unit}$$

$$v = ?$$

$$Q = \frac{\text{Sales}}{\text{Selling Price/unit}}$$

$$Q = \frac{36,000}{8} \Rightarrow 4500 \text{ units}$$

To Find 'v' $Z = S - (F + vQ)$

$$2000 = 36,000 - (16,000 + v \times 4500)$$

$$v = \underline{\underline{\text{Rs } 4/\text{unit}}}$$

To Find BEP $Q_{\text{BEP}} = \frac{F}{s-v} \Rightarrow \frac{16,000}{8-4} = \underline{\underline{4000 \text{ units}}}$

If sales revenue increases to Rs 50,000

$$Z = \text{New sales income} - (F + v)$$

$$= 50,000 - (16,000 + 4 \times 6250)$$

$$Z = \underline{\underline{\text{Rs } 9000}}$$

To Find Profit

$$\text{Total Sales Revenue} - \text{Total Variable Cost}$$

$$\underline{\underline{\text{Total Sales Revenue}}}$$

$\textcircled{5}$

$$- 2.5 \times 4 = 10 \text{ MARKS}$$

7) Productivity — 1 Mark

$$\text{Productivity} = \frac{\text{output}}{\text{Input}}$$
$$= \frac{\text{Value of outputs}}{\text{Cost of inputs}}$$

Techniques to improve Productivity

A) Technology based:

- 1) use of CAD, CAM, CIM
- 2) Robotics
- 3) Laser Technology
- 4) Modern Maintenance Techniques
- 5) Energy Technology
- 6) FMS

B) Employee based:

- 1) Financial & Non-Financial incentives
- 2) Employee Promotion
- 3) Job design, job enlargement, job enrichment
- 4) Worker participation in Mgt
- 5) TQM, QC, QIT
- 6) Personality Development
- 7) Human Engg.

C) Material Based

- 1) MRP, MRP II
- 2) Purchase of materials, Logistics
- 3) Material storage & retrieval
- 4) Waste elimination
- 5) Material Recycling & Re-use

- D) Process Based
- 1) Method studies & Work Simplification
 - 2) Job design, job evaluation, job safety

- E) Product based
- 1) Value Analysis & Value Engg.
 - 2) Product diversification
 - 3) std & Simplification
 - 4) Reliability Engg
 - 5) Product Mix & promotion

- F) Mgt based
- 1) Mgt style
 - 2) Communication practices in organization
 - 3) Work Culture
 - 4) Motivation & employee welfare
 - 5) Promoting Group Activity.

8a) Explanation of Decision Tree - 2 Marks

Example - 3 Marks

8b) Factors Affecting Productivity 2+2.5=5 MARKS

A) Controllable or internal factors

1) Product

2) plant & Equip

3) Technology

4) Materials

5) Work Methods & Processes

6) Energy Resources & Power Supply

7) Human factors

8) Mgt style.

B) unControllable or External factors

1) Changes in Economic Situation

2) Social changes & Attitudes

3) Natural Resources

4) Govt policy

5) Infrastructure.