I - IAT Solution

Subcode: 10MG81

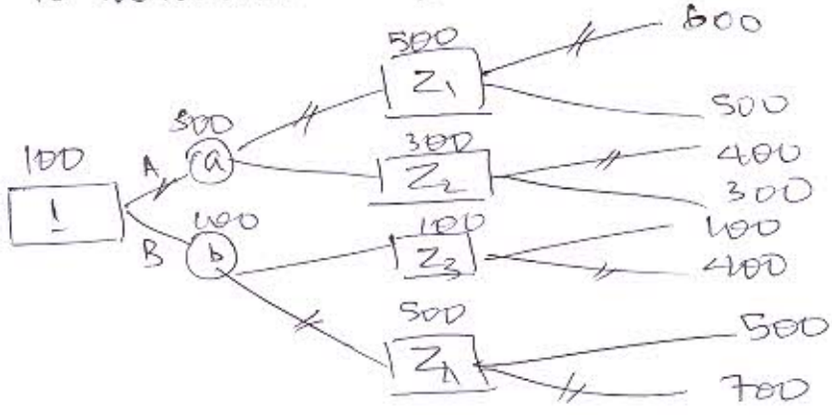
Sub: OPERATIONS MANAGEMENT

1A) Operations management can be defined as design, operation & maintainance of the transformation process, which converts inputs into desired outputs at the fastest thorough put.

Decision trees are schematic representation also refered to as tree-diagram of alternatives. Square blocks represent decision points, circular nodes represent chance event which flows from left to right. The branches emerging from these decision points are alternatives known as branches of tree.

For example, consider the following tree, the ~~advantage~~ aim is to maximise profit / min. loss.

To minimize cost;



Hence we choose the path of (A).

2A) estimated demand = 625000 units

i) stage & overall stage efficiency:

Turning = 100 - 5 = 95%

Milling = 100 - 7 = 93%

Grinding = 100 - 9 = 91%

∴ overall $\eta = \frac{95 + 93 + 91}{3} = 93\%$

ii) Gross time available/day
= 60×8 = 480 mins

turning stage :
Net time available/day = gross time − [avg. down time] − [avg. setup time]

= 480 − [100+15]
= 365 mins

Production rate/day = Net time available / process time/unit

= 365/20
= 18.25 units/day

Milling stage
Net available time/day = 480 − [160+45]
= 275 min

Production rate/day = 275/30 = 9.166 units/day

grinding stage
Net available time/day = 480 − [40+10]
= 430 min

Production rate/day = 430/50 = 8.6 units/day

iii) No. of machines req. = estimated demand/year / rate of production/year

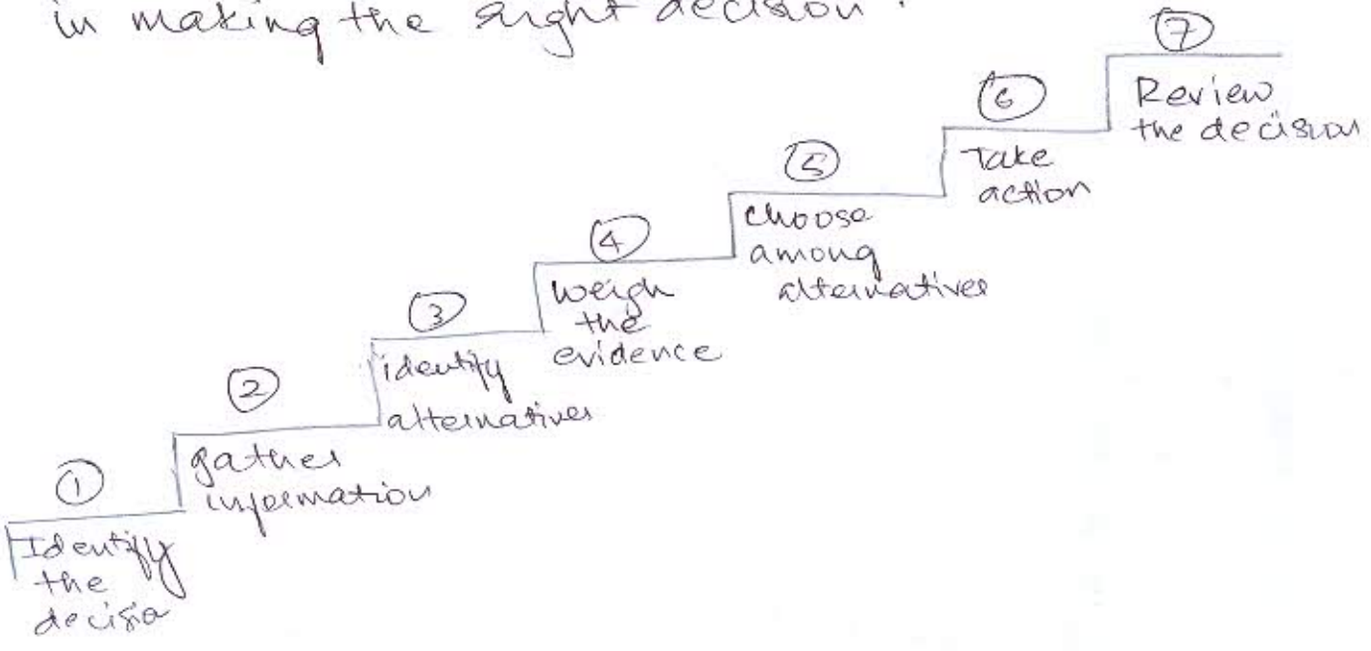
for:
• Milling = 625000 / 9.166×50×5 ≈ 273 m/c
• turning = 625000 / 18.25×50×5 = 137 m/c
• grinding = 625000 / 8.6×50×5 = 291 m/c

iv) Total cost = [300000×273] + [200000×137] + [200000×291]
= Rs 167509000

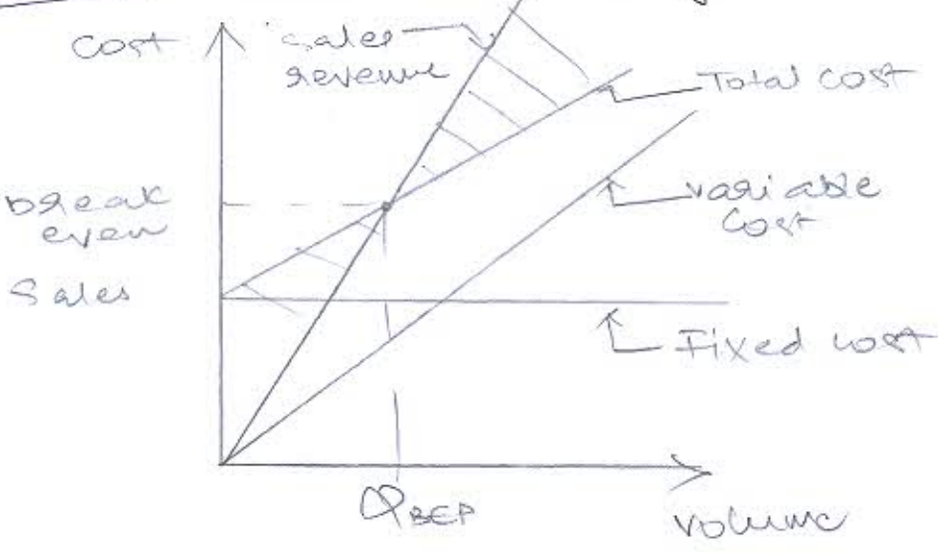
3A) Decision can be defined as the selection of the best amongst the available alternatives

Decision making is the act / process of making important decisions

Decision methodology are the steps involved in making the right decision.



4A) BEA [Break Even Analysis]



BEA is a graphical plot which relates costs & revenues for different volumes of production it clearly demarcates the line b/w profit & loss. Following important assumptions are made in BEA:

→ All costs & volumes are known
→ Quantity produced is assumed to be sold
→ All costs remain the same during period of study

(A)

let S = Sales revenue
s = Selling price / unit
V = Variable cost / unit
Q = Quantity produced
F = Fixed cost

at break even point

Total cost = Sales revenue

$$F + VQ = sQ$$

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

5A)

(a) given

F = Rs 16000

Z = Rs 2000

S = Rs 36000

s = Rs 8/unit

T.F.: i) V ii) BEP

$$S = s \cdot Q$$

$$\therefore Q = \frac{S}{s} = \frac{36000}{8} = \underline{4500 \text{ unit}}$$

Profit $Z = S - [F + V \cdot Q]$

$2000 = 36000 - [16000 + 4500 \cdot V]$

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

at BEP;

$$Q_{BEP} = \frac{16000}{8 - 4} = \underline{4000 \text{ unit}}$$

(b)

If $S = \text{Rs } 50000$

$Q = 6250$ units

$Z = S - [F + v \cdot Q]$

$= 50000 - [16000 + [4 \times 6250]]$

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

6-A] Let B_1 = event that concrete is supplied by Supplier 1

B_2 = ——— " ——— by 2

B_3 = ——— " ——— by 3

$P(B_1) = 0.5$, $P(B_2) = 0.3$, $P(B_3) = 0.2$

Let A = event that supplies have passed the test

$$P(A) = P(B_1) \cdot P(A/B_1) + P(B_2) \cdot P(A/B_2) + P(B_3) \cdot P(A/B_3)$$

$$= (0.5 \times 0.95) + (0.3 \times 0.9) + (0.2 \times 0.8)$$

$$P(A) = \underline{0.905}$$

Probability that concrete was supplied by each

$$\rightarrow P(B_1/A) = \frac{P(B_1) \cdot P(A/B_1)}{P(A)}$$

$$= \frac{0.5 \times 0.95}{0.905}$$

$$= \underline{0.524}$$

$$\rightarrow P(B_2/A) = \frac{0.3 \times 0.9}{0.905} = \underline{0.298}$$

$$\rightarrow P(B_3/A) = \frac{0.2 \times 0.8}{0.905} = \underline{0.176}$$

7-A] Productivity is defined as the ratio of output to input.

Techniques to improve productivity:

→ Technology based:

- Use CAD, CAM & CIM
- Robotics
- Laser technology
- energy technology

→ Employee based:
- employee promotion
- Job design, job rotation
- Financial & non-financial security
- Personality development

→ Process based
- Method studies & work simplification
- Job evaluation & job safety

→ Product based:
- Value analysis & value engg
- Reliability engg
- Product Mix & promotion

→ Management based:
- work culture
- Management style
- Promoting group activity

8A] a] i) productivity = $\frac{\text{Value of o/p}}{\text{cost of i/p}}$

$= \frac{50000 \times 52 \times 3}{5000 + [8000 \times 3]}$

$= 269$ burgers / rupee input

ii] productivity = $\frac{50000 \times 52 \times 5}{[4000 \times 5] + 10000} = 433$ burgers/Rs

∴ company is suggested to purchase new equipment.

b] Factors affecting productivity:

External factors:
- Government policy
- customer
- Supplier / vendor
- change in economic condition
- natural resources

Internal factors:
- Product
- Technology
- Plant & Equipment
- Materials
- management style