CMR
INSTITUTE OF
TECHNOLOGY

Internal Test –I November 2021

Sub:	Operations Management				Code:	18ME56
Date: 12/11/21	Duration: 90 mins	Max Marks: 50	Sem: 5TH	Branch:	ME	

Note: Answer any five questions:

Q.No.	Question	OBE		
		Marks	CO	RBT
1	Define Operations Management. Explain Production systems with examples?	[10]	CO1	L1
2	Bosch Tools produce automobile components whose estimated demand is 6, 25,000 units company works for 5 days a week, 50 weeks/year & 8 hrs/day. Manufacturing reamers requires 3 stages of operation, following is the additional information given below:	[10]	CO2	L3

Stage	Process time per unit (Min)	Average down time (Min)	Average daily setup time (Min)	% defects
Turning	20	100	15	5
Milling	30	160	45	7
Grinding	50	40	10	9

a. Determine stage & overall stage efficiency?
b. Determine the production rate for every stage?
c. Determine number of milling, turning & grinding machines required?
d. Total cost in procuring these machines if milling machine costs Rs3 lakhs, turning & grinding costs Rs2 lakhs each?

Q.No.	Question	Marks	CO	RBT
3	What is meant by productivity? Explain different techniques to improve productivity?	[10]	CO1	L1
4	A Burger factory produces 50,000 burgers each week The equipment costs Rs 5,000 and will remain productive for 3 years the annual labor cost is Rs 8,000. a. Determine productivity over a 3 year Period? b. Management has the option of Rs 10,000 equipment with an operating life of five years it would reduce labor costs to Rs 4,000 per year. Should management purchase this equipment?	[10]	CO2	L3
5	Explain different factors affecting productivity?	[10]	CO1	L1

6	A Firm makes two products X & Y And has a total production capacity of 9 ton's per day. X&Y Requiring the same production capacity the firm has a permanent contract to supply at least 2 ton's of X and at least 3 ton's of Y per day to another company each ton of X requires 20 Machine hours production time and each ton of Y requires 50 machine hours Production time the daily maximum possible no. of hours is 360 all the firms output can be Sold and the profit obtained is Rs 800 per ton of X and Rs 1200 per ton of Y respectively. Formulate The LPP and solve it graphically?	[10]	CO2	L3

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Scheme & Solutions

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Note: Answer any five questions, Missing data if any may be assumed suitably:

Q.No.	Question	OBE		
		Marks	CO	RBT
1a	Explanation of Operations Management -2 Marks Explanation of four different production systems-8 Marks (2 Marks each- 2X4)	[10]	CO1	L1
2a	a. Determination of stage & overall stage efficiency-3 Marks b. Determination of production rate for every stage-2 Marks c. Determine number of milling, turning & grinding machines required- 3 Marks d. Total cost of procurement – 2 Marks	[10]	CO2	L3
3a	Explanation of productivity- 2 Marks Explanation of eight different techniques to improve productivity-1 Mark each (1X8)	[10]	CO1	L1
4a	a. Determination of productivity over a 3 year Period- 5 Marks b. Management has the option of Rs 10,000 equipment with an operating life of five years it would reduce labor costs to Rs 4,000 per year. Should management purchase this equipment- 5 Marks	[10]	CO2	L3
5a	Explanation of different factors affecting productivity Six internal factors and four external factors 1 Mark each (6+4)	[08]	CO1	L4
6a	Formulation of LPP-6 Marks Graphical solution- 4 Marks	[05]	CO1	L1

Schemed Solutions

1) OM is the Process of effectively planning & regulating the Activities of that part of an enterprise which is Responsible For Actual Transformation of Materials into Finished products

Inputs →   Environment
Land   ↓
Labor   Conversion   → output
Capital   Process   Products /
Mgt   services
energy

← Feed back ←
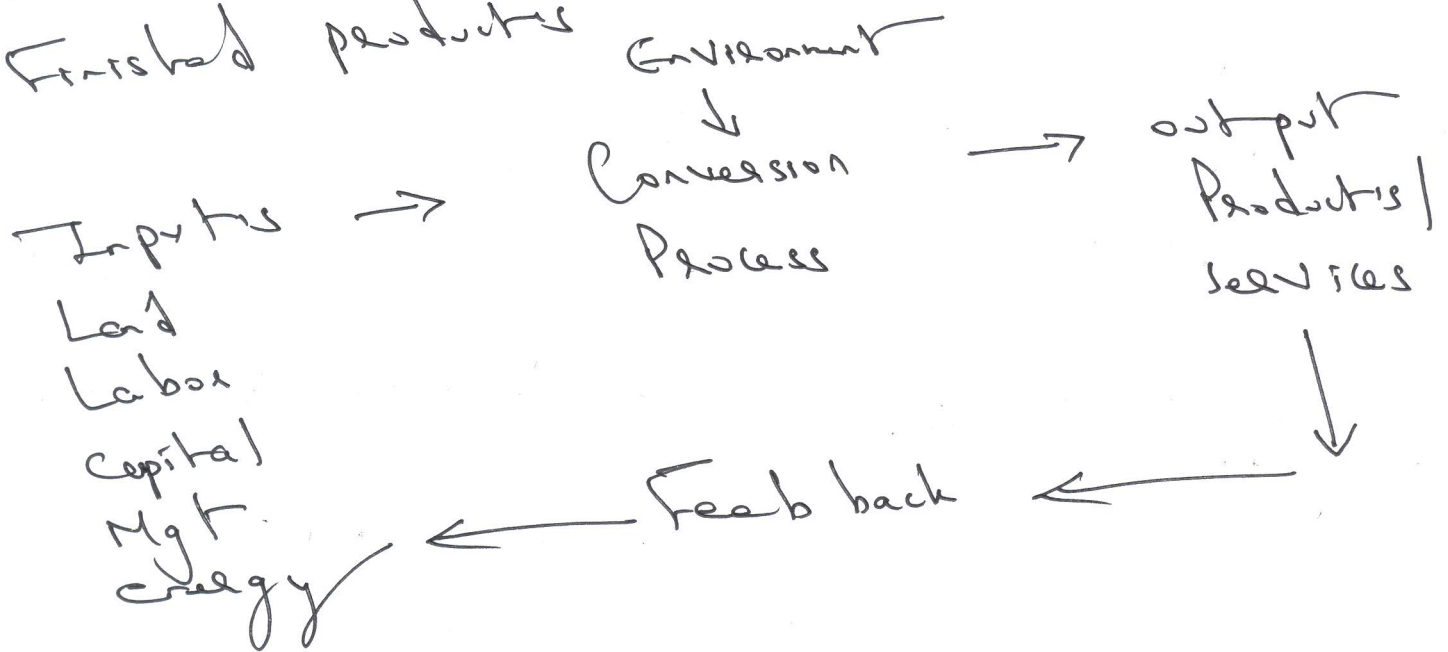
Types of production systems

① Continuous production systems

   a) Mass Production
   b) Process Production

② Intermittent Production system

   a) ─── Job Production
   b) Batch Production & its Explanation.

(3)

$$\text{Productivity} = \frac{o/p}{I/p}$$

Techniques to improve Productivity

a) Technology Based

b) Employee based

c) Material based

d) Process based

e) Product Based

f) Mgt Based

(4)

a. $\text{Productivity} = \dfrac{\text{Total Burgers Produced}}{\text{Labor} + \text{Eqpt}}$

$$= \frac{50,000 \times 52 + 3}{8000 \times 3 + 5000}$$

$$= 269 \text{ Burgers} / \text{Input}$$

b. $\text{Productivity} = \dfrac{50,000 \times 52 \times 5}{4000 \times 5 + 10,000}$

$$= 433 \text{ Burgers} / \text{Input}$$

Mean Squared Error For 3PMA = 351.72 — 2 Marks

MSE For SES = 248.61 — 2 Marks

Comparing both SES is the best
Technique.

② Estimated Demand = 6,25,000 units

a) Turning stage efficiency = 100−5 ⇒ 95%.
Milling stage efficiency = 100−7 ⇒ 93%.
Grinding stage efficiency = 100−9 ⇒ 91%.

overall stage efficiency = $\frac{(95+93+91)}{3}$ ⇒ 93%.

— 2.5 Marks

b) Gross Time Available Per day = 60×8 ⇒ 480 Min

Turning stage

Net time Available in a day = (Gross Time −
Avg downtime − Avg daily setup time)

= 480 − 100 − 15
⇒ 365 Min

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

= 365/20 ⇒ 18.25 units per day

Milling stage

Net Time Available in a day $= 480 - 160 - 45$

$\Rightarrow 275 \text{ Min}$

Prodn Rate Per day $= 275 / 30$

$\Rightarrow 9.16$ units Per day

Grinding stage

Net Time Available in a day $= 480 - (40 + 10)$

$\Rightarrow 430 \text{ Min}$

Prodn Rate Per day $= 430 / 50$

$\Rightarrow 8.6$ units Per day — 3 MARKS

(c) No of M/c's Required $= \dfrac{\text{Demand Per Year}}{\text{Rate of Prodn Per Year}}$

No of Turning M/c's Required

$\Rightarrow 6,25,000 / 18.75 \times 5 \times 50$

$\Rightarrow 137 \text{ M/c's}$

No of Milling M/c's Reqd $= 6,25,000 / 9.16 \times 5 \times 50$

$\Rightarrow 273 \text{ M/c's}$

No of Grinding M/c's Reqd $= 6,25,000 / 8.6 \times 5 \times 50$

$\Rightarrow 291 \text{ M/c's}$

— 3 MARKS

(d) Total Cost $= 137 \times 2,00,000 + 273 \times 3,00,000 +$

$291 \times 2,00,000$

$\Rightarrow$ Rs 16.75 Crores — 1.5 MARKS

(3)

(6)

Let x_1, x_2 be the 2 Products x & y
Product by a Firm

Max $z = 8000x_1 + 12000x_2$

s.t

$x_1 + x_2 \leq 9$

$x_1 \geq 2$

$x_2 \geq 3$

$20x_1 + 50x_2 \leq 360$

$\Bigg\}$ LPP Formulation.

Graphical Solution

The Firm should Manufacture 3 Tons of x & 2 Tons of y — To Maximise Profit of Rs 9600/-