ASSIGNMENT

INDUSTRIAL FACILITY DESIGN

Submitted To:

DR. HARIS AZIZ

SUBMITTED BY:

GROUP NO. 10

11- IE - 65
11- IE - 55
11- IE - 56

TOPIC:

Chapter No. 2 → 2.12
Chapter No. 3 → 3.22

Group No. 10

MUHAMMAD BADAR 11-IE-65

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CHAPTER NO. 3

QNo. 3.22

Q:

Use the DCA to form cells for the machine-tool/parts matric shown below. If Conflicts exists, Purpose alternative approach for resolving the Conflicts.

Sol:

Part #	Machine # 1	2	3	4	# of 1's
1		1	1		2
2	1				1
3			1		1
4	1			1	2
# of 1's	2	1	2	1	

⇒ **STEP 1:** we arrange the # of 1's according to desending order in Row wise and if ties exists b/w Two, we write them in the decending order.

➡ **Row wise:**

Part #	Machine # 1	2	3	4	# of 1s
4	1			1	2
1		1	1		2
3			1		1
2	1				1
# of 1s	2	1	2	1	

➡ Now arrange the # of 1s in the acending order in column wise.

➡ **Column wise:**

Part #	4	2	3	1	# of 1s
4	1			1	2
1		1	1		2
3			1		1
2				1	1
# of 1s	1	1	2	2	

➡ **STep 2:**

Now which column has 1 in the 1st row, write them in the left

Part #	4	1	3	2	# of 1s
4	1	1			2
1			1	1	2
3			1		1
2		1			1
# of 1s	1	2	2	1	

STep 3:

In STep 3 whose row has 1 in the 1st column move that row upward.

Machine #

Part #	4	1	3	2	# of 1's
4	1	1			2
2		1			1
1			1	1	2
3			1		1
# of 1's	1	2	2	1	

⇒ Hence Two cells are formed.

Machine #

Part #	4	1	3	2
4	1	1		
2		1		
1			1	1
3			1	

Chapter No. 2

Q No. 2.12

Q:

Expected Demand = 2000

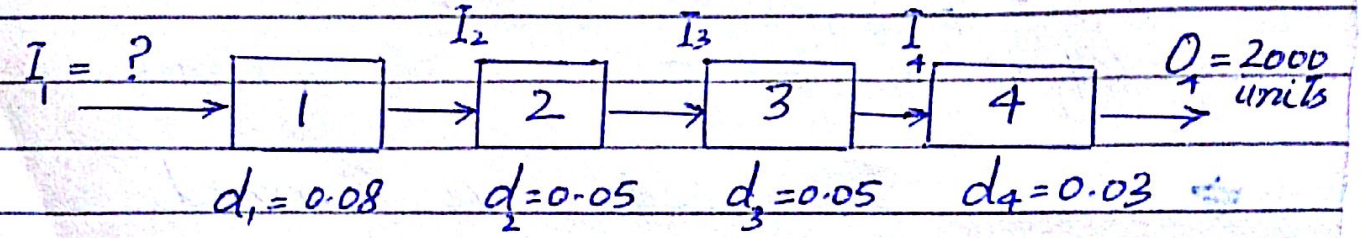
Four step disassembly process

defect rate:

$d_1 = 0.08$, $d_2 = 0.05$

$d_3 = 0.05$, $d_4 = 0.03$

Sol:



$$I_4 = O_4/(1-d_4)$$

$$= 2000/(1-0.03)$$

$$\Rightarrow \boxed{I_4 = 2061.855}$$

$$I_3 = O_3/(1-d_3)$$

$$= 2061.855/(1-0.05)$$

$$\Rightarrow \boxed{I_3 = 2170.374}$$

$$I_2 = O_2/(1-d_2)$$

$$= 2170.374/(1-0.05)$$

$\Rightarrow \boxed{I_2 = 2359.102}$

$I_1 = O_2/(1-d_1)$

$= 2359.102/(1-0.08)$

$\Rightarrow \boxed{I_1 = 2564.241}$

Group #12.

Assignment problems

chp. no. 03

Submitted by:

11-IE-33

11-IE-44

11-IE-66

II-IE-33, 44, 66

Q # 3.24 :-

Part # ↓ / M/C # →	1	2	3	4	5	6	7	8	
1	1	1	1						3
2	1			1	1				3
3		1	1			1			3
4				1	1			1	3
5					1		1	1	3
6	1		1			1			3
7		1	1			1			3
8				1	1				3
9	1	1	1						3
10				1	1	1			3
	4	4	5	4	5	4	2	2	

Step (i): Arrange rows having sum of '1' in "desending order" & Arrange columns has in "asending order". And in case of tie use "desending order"

Part # ↓ / M/C # →	8	7	6	4	2	1	5	3	Desending order ↓
10		1		1			1		3
9					1	1		1	3
8			1	1			1		3
7			1	1	1			1	3
6			1	1		1		1	3
5	1	1					1		3
4	1			1			1		3
3			1	1	1			1	3
2				1		1	1		3
1					1	1		1	3
	2	2	4	4	4	4	5	5	

Step#02: "shifting columns" by seeing rows having 1 on extreme left side of rows.

M/C # →	7	5	4	3	2	1	6	8	Sum of "1"
Part #									
10	1	1	1						3
9				1	1	1			3
8		1	1				1	1	3
7				1	1		1		3
6				1		1	1		3
5	1	1						1	3
4		1	1					1	3
3				1	1		1		3
2		1	1			1	1		3
1				1	1	1			3
	2	5	4	5	4	4	4	2	

Step 3: "Shifting rows" by seeing columns having "1" on upper side.

M/C #	7	5	4	3	2	1	6	8	
Part #									
10	1	1	1						3
5	1	1						(1)	3
8		1	1				(1)		3
4		1	1					(1)	3
2		1	1			(1)			3
9				1	1	1	1		3
7				1	1	1			3
6				1		1	1		3
3				1	1		1		3
1				1	1	1			3
	2	5	4	5	4	4	4	2	

CELL 1

CELL 2

Backlog / Back tracing

Group # 05

Industrial facility design

Assignment ⟶ 1 and 2

Questions - 3.36
-2.17

11-IE-09
11-IE-42
11-IE-43

Submitted to :

D.r Haris.

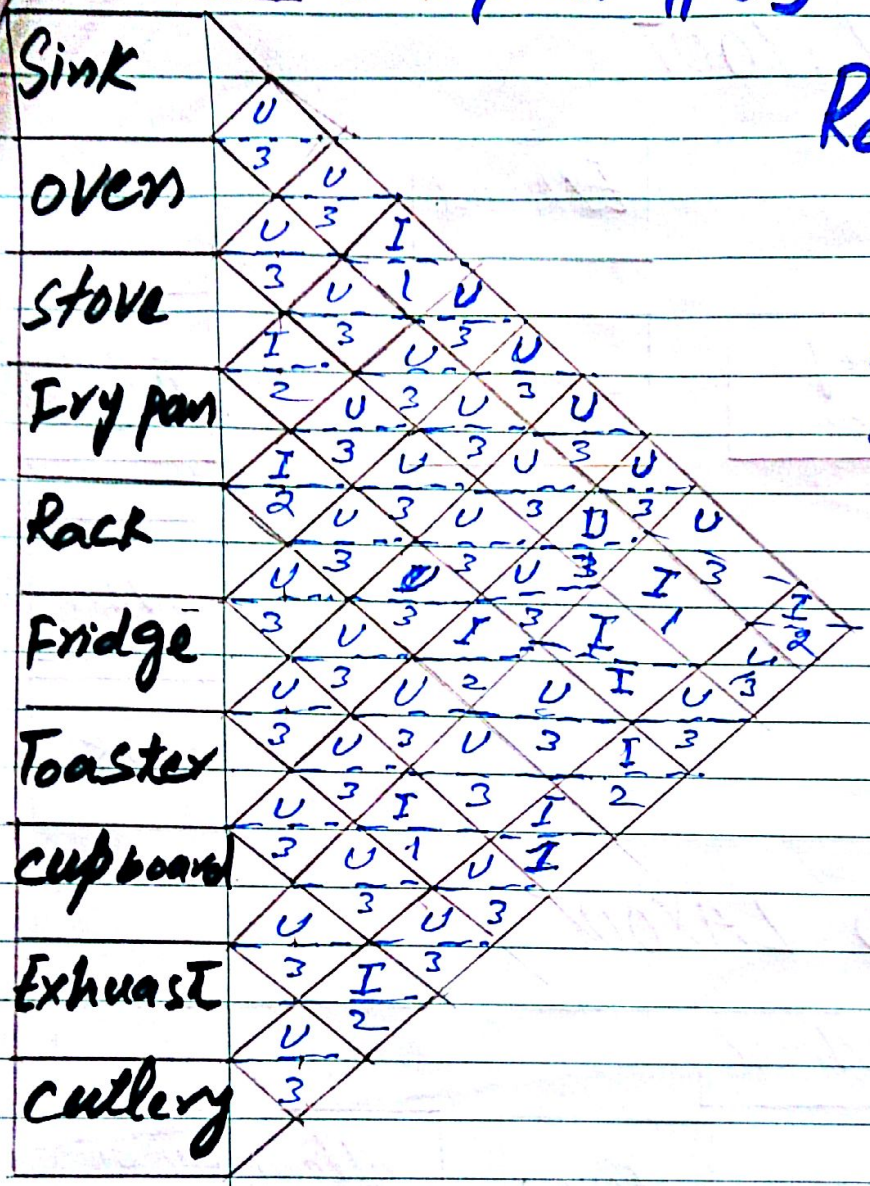
Day / date 24-09-14 **Chapter #03** **Question 3.36**

Roll. No

11-1E-09

11-1E-42

11-1E-43



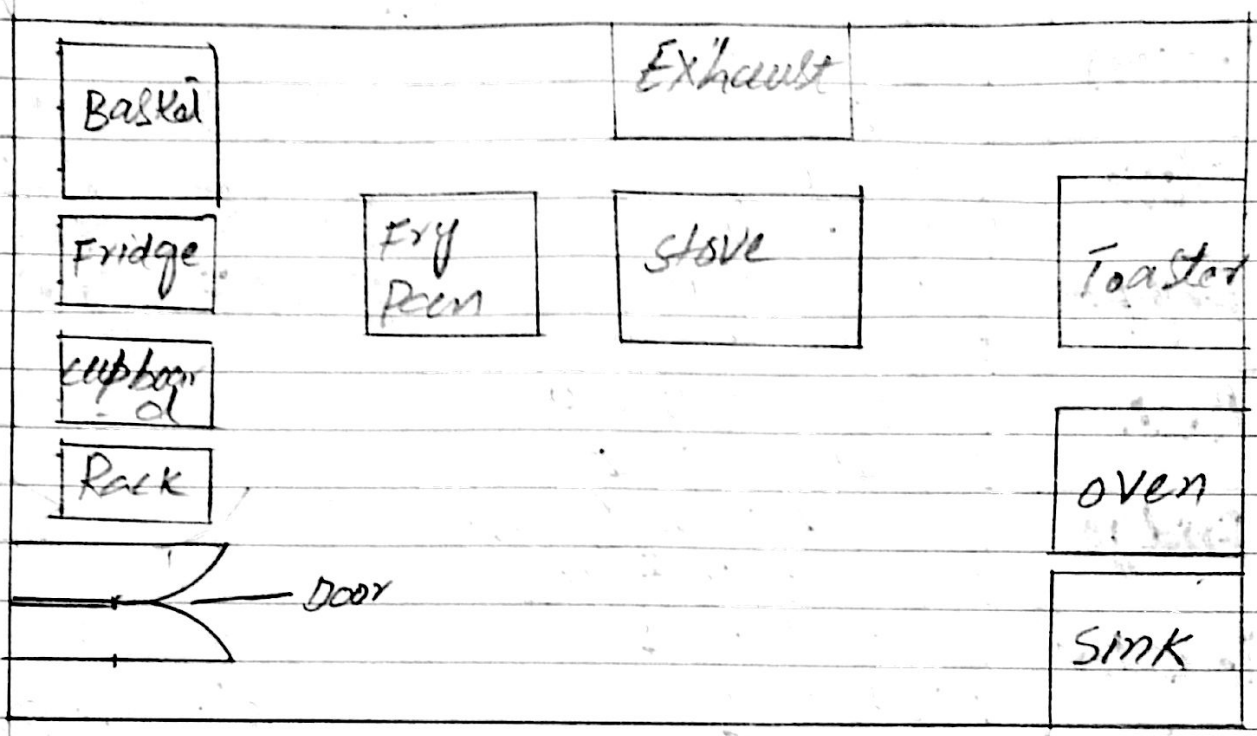
value	Closness
I	important
U	Unimportant

code	Reason
1	frequency of use high
2	" " medium
3	" " Low.

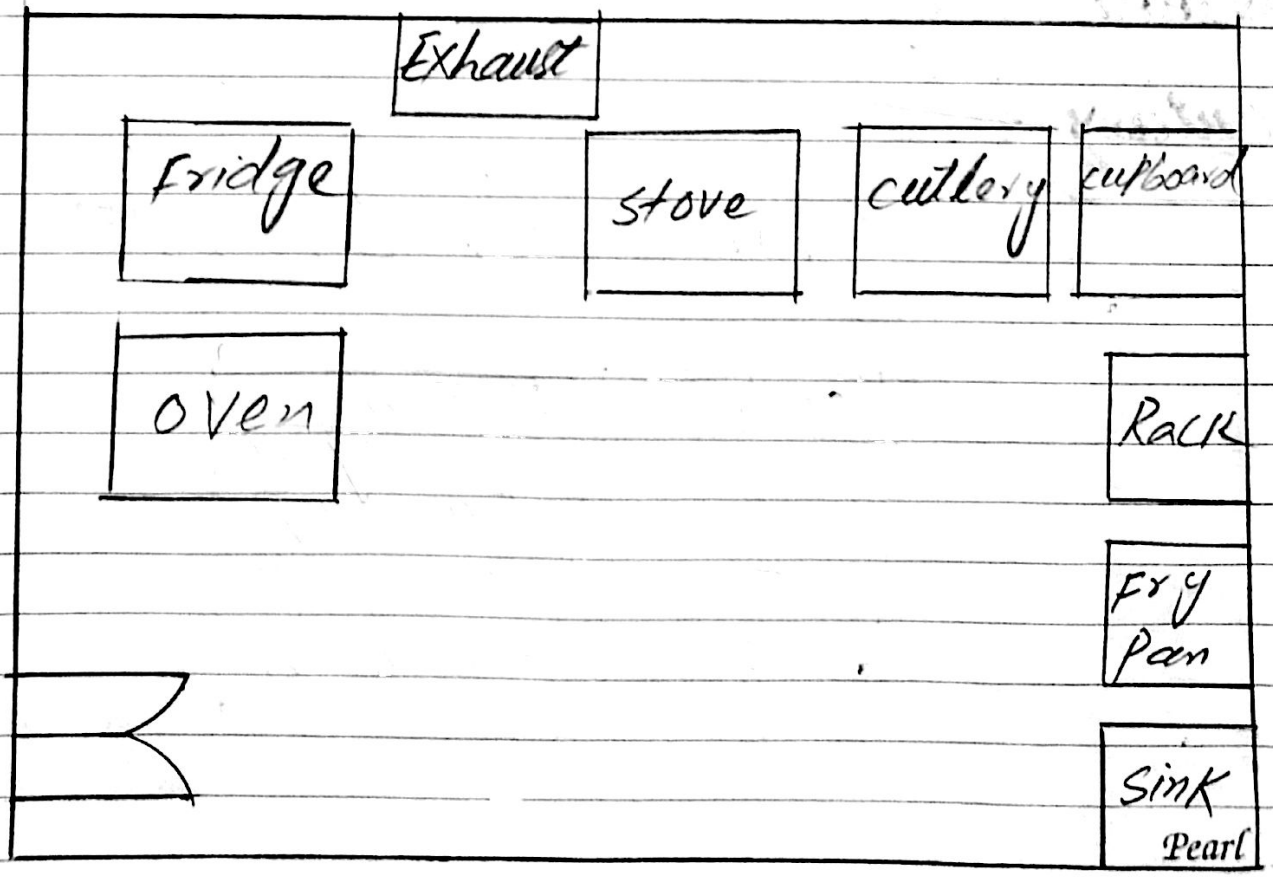
Pearl

day / date

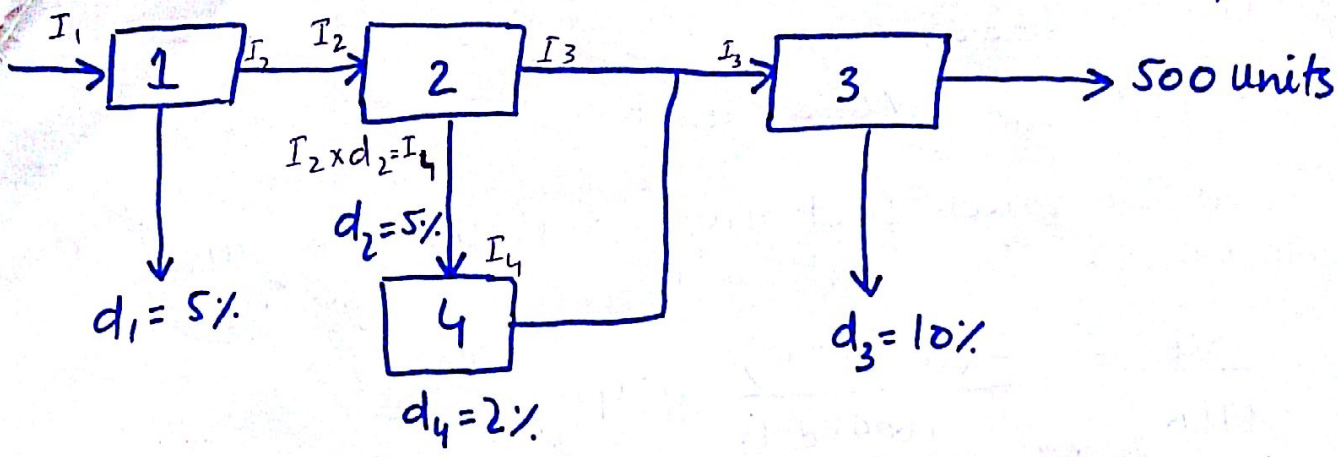
FIRST LAYOUT



IMPROVED LAYOUT



Q NO 2.17 Group #5



Solutions:

First we will find all inputs

$$I_3 = O_2 + O_4 \quad \text{——— (i)}$$

$$I_4 = I_2 \times d_2 \quad \text{——— (ii)} \quad \text{from diagram}$$

$$I_4 = \frac{O_4}{1-d_4}$$

$$I_4 \times (1-d_4) = O_4 \quad \text{——— (iii)}$$

Put the value of I_4 in (ii).

$$I_2 d_2 \times (1-d_4) = O_4 \quad \text{——— (iv)}$$

Putting (iv) in (i).

$$I_3 = I_2(1-d_2) + I_2 d_2 (1-d_4)$$

$$I_3 = I_2(1-d_2) + d_2(1-d_4)$$

$$I_2 = \frac{I_3}{(I-d_2) \quad + d_2(1-d_4)}$$

Putting values we get:

$I_2 = 5561.11$ units.

$$I_1 = \frac{O_1}{1-d_1} = \frac{5561.11}{1-0.05} = 5853.8 \text{ units}.$$

$$I_4 = I_2 \times d_2 = 278.05 \text{ units}.$$

Now we will find the machines required. Took values of S, E, H, R from question.

$$F_1 = \frac{S\Phi}{EHR} = \frac{3(5853.8)}{1 \times 4800 \times 0.95} \approx 4.$$

$$F_2 = \frac{S\Phi}{EHR} = \frac{2 \times (5561.11)}{0.95 \times 4800 \times 0.90} = 2.56 \approx 3$$

$$F_3 = \frac{S\Phi}{EHR} = \frac{5 \times (5555.55)}{1.02 \times 4800 \times 0.90} \approx 6$$

$$F_4 = \frac{S\Phi}{EHR} = \frac{10 \times 278 \times 05}{0.90 \times 2400 \times 0.95} = 1.35 \approx 1$$

IFD problems (CH #2,3)

Submitted To :

Dr. Haris Aziz

Group #11.

Submitted By :

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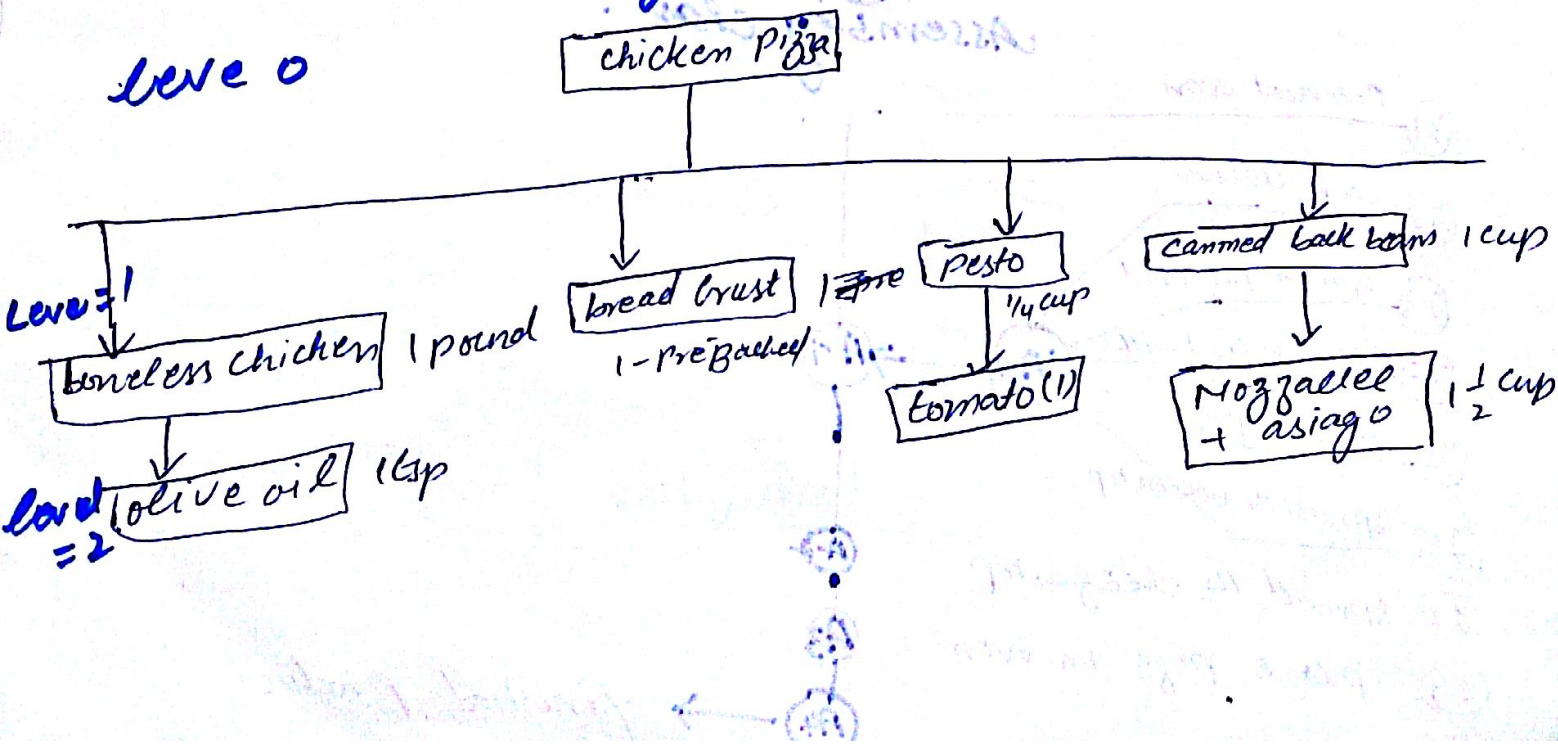
IED UET Taxila

Q No: 2.10

Sol (a) List Ingredients (parts List)

	Ingredient Name	Quantity
(i)	bone less chicken	1 pound
(ii)	olive oil	1 tsp
(iii)	Italian bread shell Crust	1 pre-Baked
(iv)	Pesto	1/4 cup
(v)	tomato	1
(vi)	canned back beans	1 cup
(vii)	Mozzarelet asiago with Roasted garlic cheez	1 1/2 cup.

(b) Bill of Material.



(C)

Route sheet :-

Company: Fast food part name: Chicken pizza

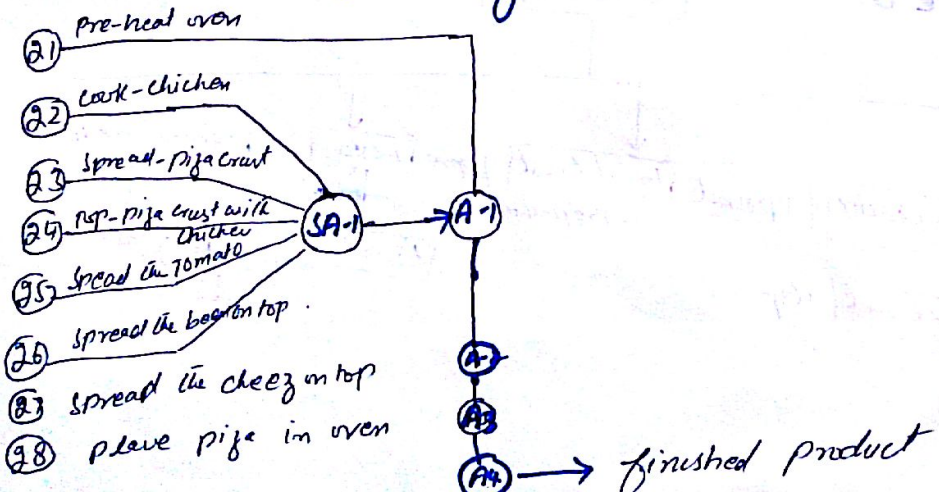
prepaired by: M.A.J part no: Pz-01

Date: 25-09-2016

Operation No:	operation discription	operation Time (Min)
1	pre-heat the oven	5
2	Cook the chicken in oil	5
3	Spread the pizza crust with pesto	2
4	Top the pizza crust with chicken	3
5	Spread the chopped tomato on the top of the chicken	1
6	Spread the bean on top	1
7	Spread the cheese on top of beans	1
8	place in oven for 10-12 Minutes	10-12
9	finished	1

(D)

Assembly chart.

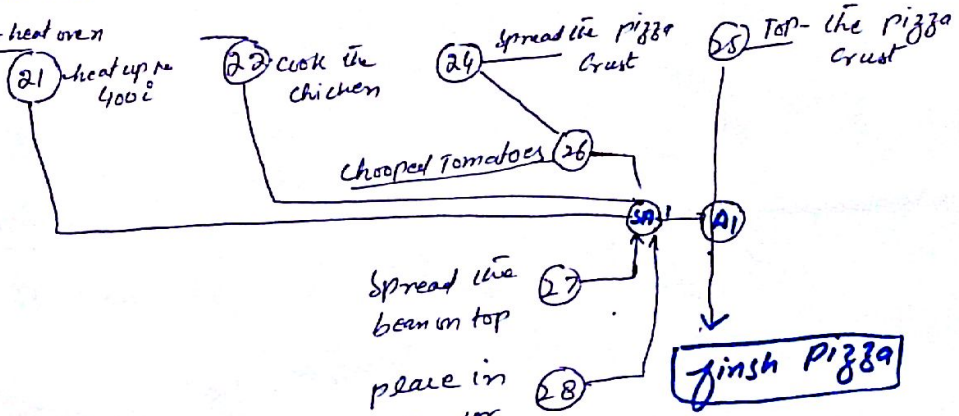


(E)

operation process chart

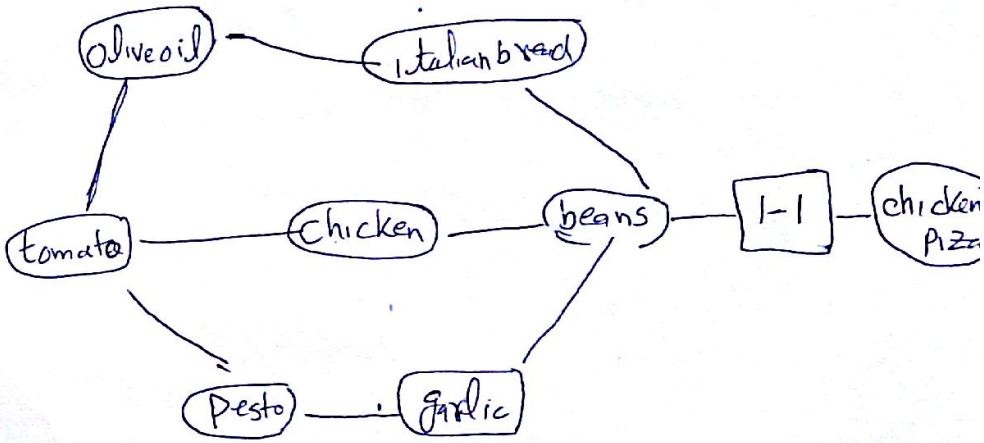
Company: Fast Food prepared by: M.A.J

product: Chicken Pizza Date: 25/09/2016



(F)

precedence diagram



Q. NO. 3.23

Part No. ↓ \ M/c No. →	1	2	3	4	5	# of 1's
1	1		1			2
2						0
3		1		1	1	3
4	1		1			2
5		1				1
6				1	1	2
# of 1s	2	2	2	2	2	

Solution:-

Step 1: Ordered M/c Part Matrix.

	5	4	3	2	1	
3	1	1		1		3
6	1	1				2
4			1		1	2
1			1		1	2
5				1		1
2						0
	2	2	2	2	2	

Step 2: Column-sorted M/c Part Matrix.

	5	4	2	3	1
3	1	1	1		
6	1	1			
4				1	1
1				1	1
5			1		
2					

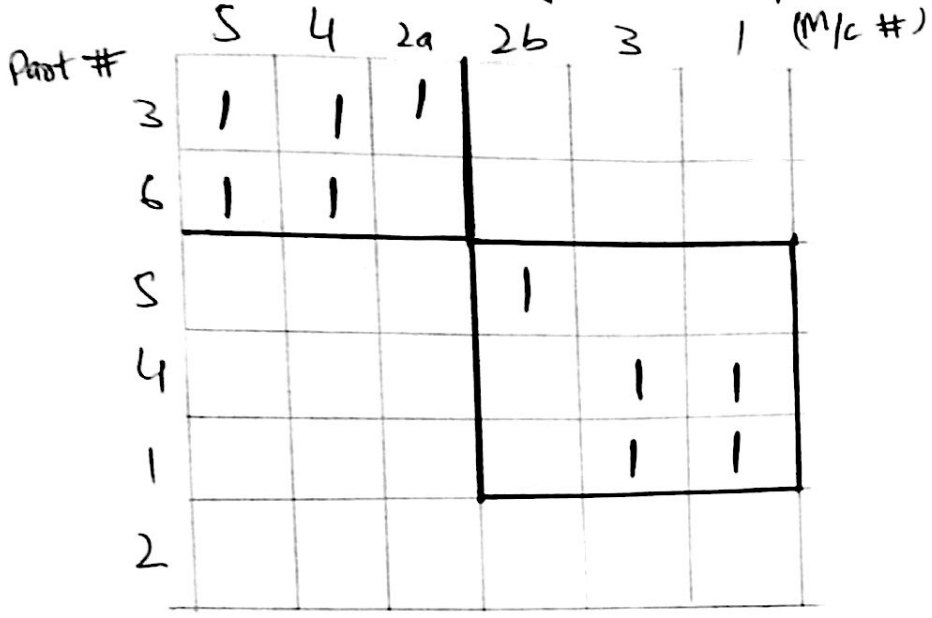
I_3 : Row-Sorted M/c Part Matrix

	5	4	2	3	1
3	1	1	1		
6	1	1			
5			1		
4				1	1
1				1	1
2					

Step-4: Formation of Two cells.

	5	4	2	3	1
3	1	1	1		
6	1	1			
5			1		
4				1	1
1				1	1
2					

ep 5: Alternative Grouping of M/cs.



Industrial Facility Design

Quiz Questions

Chapter 2 , 3

Group 9

MEMBERS

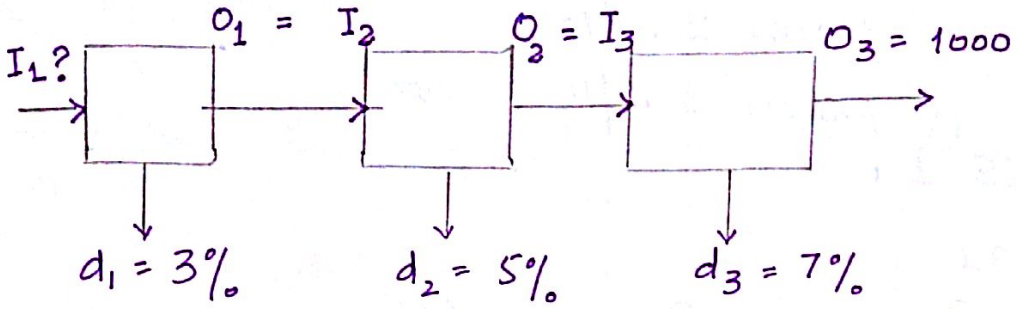
- Sheroz Azhar 11-IE-18.
- Junaid Hassani 11-IE-36.
- Summyia Qamar 11-IE-46.

SUBMITTED TO:

Dr. Haris

CHAPTER 2.

QUESTION 2.13:



CASE I:

$$\because I_3 = O_3 / 1 - d_3$$

$$= 1000 / 1 - 0.07 = 1075 \text{ units}$$

$$\because I_3 = O_2.$$

$$I_2 = 1075 / 1 - 0.05 = 1131 \text{ units}$$

$$I_1 = 1131 / 1 - 0.03 = \boxed{1166 \text{ units}}$$

CASE II

$$d_1 = 7\% \quad ; \quad d_3 = 3\%.$$

$$\Rightarrow I_3' = 1000 / 1 - 0.03 = 1030 \text{ units}.$$

$$I_2' = 1030 / 1 - 0.05 = 1085 \text{ units}.$$

$$I_1' = 1085 / 1 - 0.07 = \boxed{1166 \text{ units}}$$

HENCE; I_1 for case I is same if we interchange the defect rate for case II.

PART B:

Scrap cost for process 1 is 5$

process 2 is $10.

process 3 is $15.

COST FOR CASE 1:

Scrap parts are.

$I_3 - O_3$, $I_2 - O_2$, $I_1 - O_1$.

$D_3 = 1075 - 1000$

$= 75$ units $\Rightarrow$ Cost $= 75 \times 15\$ = \$1125$.

$D_2 = 1131 - 1075 = 56$ units.

$D_1 = 1161 - 1131 = 35$ units.

Total Cost $= (75 \times \$15) + (56 \times \$10) + (35 \times \$5)$

$= \$1860$

CASE II:

Scrape parts $D_3 = 1030 - 1000 = 30$ units.

$D_2 = 1085 - 1030 = 55$ units.

$D_1 = 1166 - 1085 = 81$ units.

Total Cost =

$= (30 \times \$15) + (55 \times \$10) + (81 \times \$5)$

$= \$1225$.

Since cost of scrap for case II is lower so we will prefer system II.

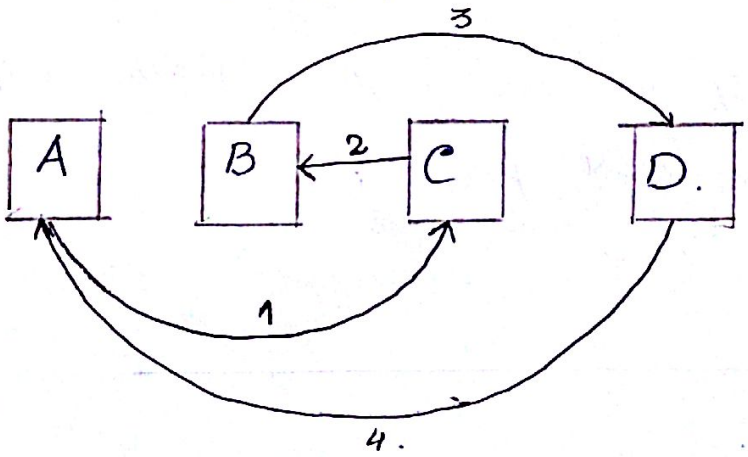
CHAPTER 3.

QUESTION 15:

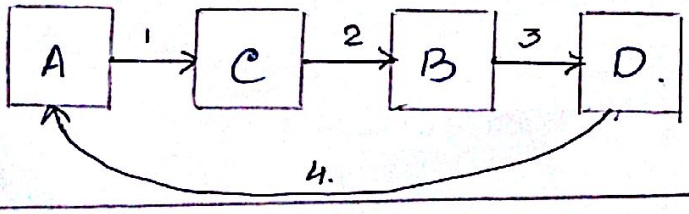
From \ To	A	B	C	D
A			4	
B				4
C		4		
D	4.			

Recommend overall flow to reduce the total flow:

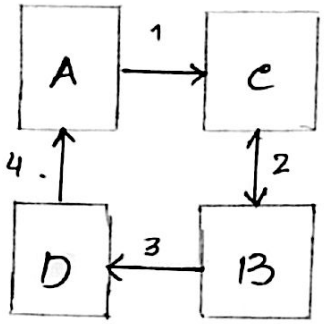
GIVEN CONDITION:



RECOMMENED FLOW:



OR.



FROM \ To	A	C	B	D
A		4		
C			4	
B				4
D	4			

Since most of the entries are in the upper triangle so the most possible flow is attained which can reduce flow.

IFD Quiz:-

Submitted to: Dr. Haris

Submitted by: Group 8

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Hafiz	Umer	11-IE-59
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Industrial Engineering Department

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Group Members

Group 8

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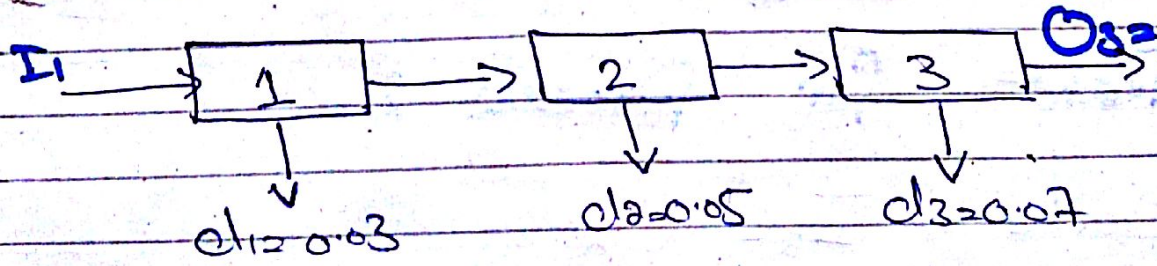
Q#2.14 Consider the problem 2.13, in this case, each process is capable of rework. Given the information in the following table, what is the input required to satisfy a demand of **1000 units**

Process	Defect Rate	Rework Rate
1	3%	60%
2	5%	75%
3	7%	80%

Suppose that Scrap costs are negligible, and rework costs are $2, $3, and $4 respectively.



$$I_3 = \frac{O_3}{1-d_3} \Rightarrow \frac{1000}{1-0.07}$$

$$I_3 = 1075 \text{ units}$$

Case I

$$I_2 = \frac{O_2}{1 - d_2} \Rightarrow \frac{1075}{0.95}$$

$I_2 = 1131$ units $\Rightarrow I_2 = O_1$

$$I_1 = \frac{O_1}{1 - d_1} \Rightarrow \frac{1131}{0.97}$$

$I_1 = 1161$ units

Defect Rate for Process 1

Defect Parts $= I_1 - O_1$

$= 1161 - 1131$

Defect Parts $= 30$ units

By using rework rate and cost

$= 30 \times 0.6 \times 2$

Rework cost $= 36\$$

Defect Rate for Process 2

Defect Parts $= I_2 - O_2$

$= 1131 - 1075$

$= 56$ units

$= 56 \times 0.75 \times 3$

Rework Cost $= 126\$$

Defect Rate for Process 3

Defect Rate $= I_3 - O_3$

$= 1075 - 1000$

$= 75$ units

Rework cost $= 75 \times 0.8 \times 4$

Rework Cost $= 240\ \$$

Case II

$d_1 = 7\%$ $\quad d_3 = 3\%$

$I_3 = \frac{1000}{1-0.03} = 1030$ units

$I_2 = \frac{1030}{1-0.5} = 1085$ units

$I_1 = \frac{1085}{1-0.07} = 1166$ units

For Process 1

Defective parts $= I_1 - O_1$

$= 1166 - 1085$

$= 81$ units

Rework cost $= 81 \times 0.6 \times 2$

Rework Cost $= 97\ \$$

For Process 2

Defective Parts $= I_2 - O_2$
$= 1085 - 1030$
$= 55$ units

Rework cost $= 55 \times 0.75 \times 3$

$= 123$ $

For Process 3

Defective parts $= I_3 - O_3$
$= 1030 - 1000$
$= 30$ units

Rework Cost $= 30 \times 0.8 \times 4$

Rework Cost $= 96$ $

For Case I

Total Cost $= 402$ $

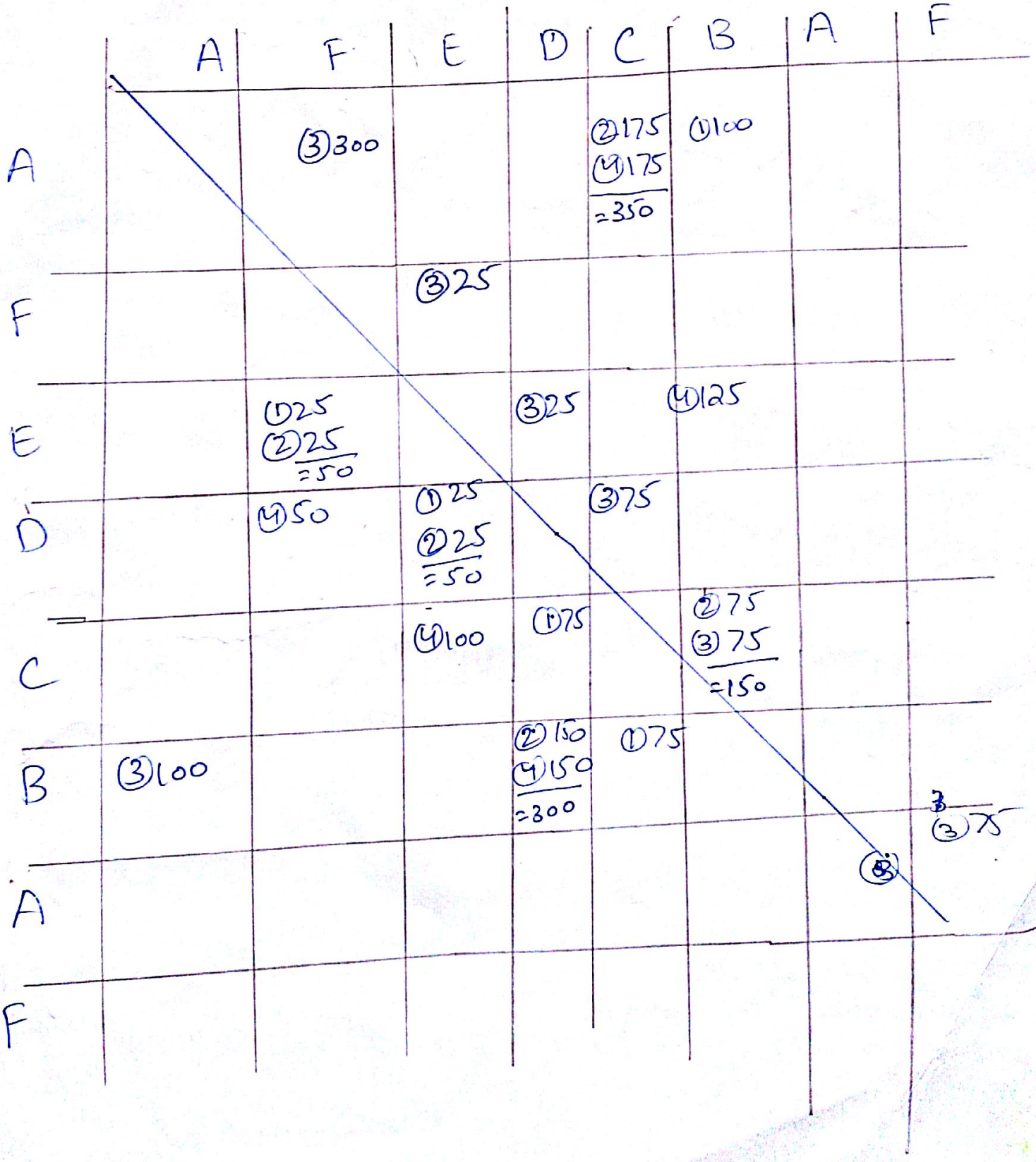
For Case II

Total Cost $= 316$ $

So, it means that by changing the defect rate, rework cost for defect rate is minimum.

Q# 3.14

Sdution of 3.14:-



Assignment

Group # 07

Reg #

11-IE-25
11-IE-51
11-IE-52

Q # 2.15

Group#07

Question 2.15

11-IE-25
11-IE-51
11-IE-52

Solution:-

We have formula for no. of Machines.

$$F = \frac{SQ}{EHR}$$

S = Standard time per unit produced

Q = No. of units produced

E = Actual performance

H = Amount of time available per machine.

R = Reliability

Q = 3000 parts per week

Time available

18 hours per day

5 days per week

5 x 18 = 90 hours per week

* Because unit of standard time is in minutes so we will convert available time in minutes

90 x 60 = 5400 minutes per week

There are two operations A and B

No. of machines for A = F_1

No. of machines for B = F_2

Total no. of machines => $F = F_1 + F_2$

For operation A no. of Machines:-

$$F_1 = \frac{3 \times 3000}{.95 \times 5400 \times .95} \Rightarrow \frac{9000}{4873.5} = \boxed{1.846}$$

For operation B no. of Machines:-

$$F_2 = \frac{5 \times 3000}{0.95 \times 5400 \times .90} \Rightarrow \frac{15000}{4617} = \boxed{3.24}$$

Total no. of Machines

$$F = F_1 + F_2$$

$$= 1.846 + 3.24$$

$$= 5.09$$

$$\boxed{F = 5.09}$$

GROUP # 06

ASSIGNMENT

Question # 2.16

Submitted to;

Dr. Haris Aziz.

Submitted by;

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Mohsin Tariq 11-1E-22

Shahbaz Farid 11-1E-35

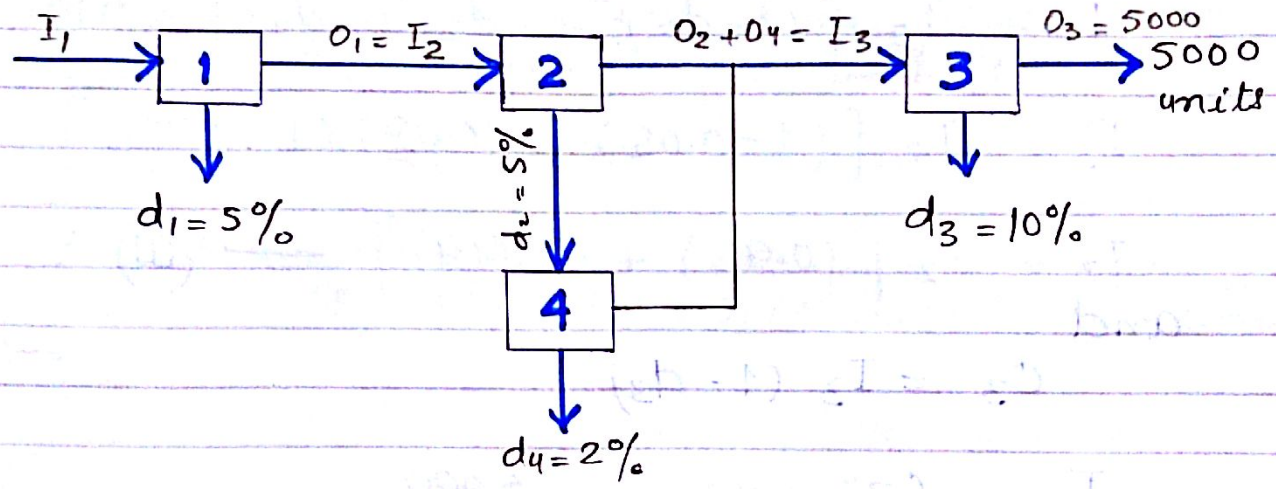
U.E.T Taxila

ASSIGNMENT.

Chapter # 02. Group # 06

2.16.

Given the figure below, operations 4 represents a rework operation ---- ?



As we know that

$$O_K = I_K (1 - d_K)$$

For operation 1.

$$O_1 = I_1 (1 - d_1)$$

For operation 2.

$$O_2 = I_2 (1 - d_2) \quad \text{——(A)}$$

Operation 4 is for the rework. So the Input of I_4 is the product of Defective part (d_2) of operation 2 into Input of operation 2 (I_2)

$$I_4 = I_2 \times d_2. \quad \text{— (I)}$$

For output of operation 4.

$$O_4 = I_4 (1 - d_4)$$

$$O_4 = I_2 \cdot d_2 (1 - d_4) \quad \text{——(B)}$$

and

It is clearly shown in the figure that Input of Operation 3 (I_3). is the combination of the outputs

of operation 2 and operation 4.

$$I_3 = O_2 + O_4 \quad \text{—— (II)}$$

Put eq (A), (B) in eq (II).

$$I_3 = I_2 (1-d_2) + I_2 \cdot d_2 (1-d_4) \quad \text{—— (C)}$$

$$I_3 = I_2 \left[(1-d_2) + d_2(1-d_4) \right]$$

$$I_3 = I_2 \left[(1-0.05) + (0.05)(1-0.02) \right]$$

$$I_3 = I_2 \left[(0.95) + (0.049) \right] \quad \text{—— (III)}$$

and

$$O_3 = I_3 (1-d_3)$$

$$I_3 = \frac{O_3}{(1-d_3)} = \frac{5000}{(1-0.10)}$$

$$\boxed{I_3 = 5555.55 \text{ units}}$$

Put this I_3 value in eq (III)

$$(5555.55) = I_2 (0.999)$$

$$I_2 = \frac{5555.55}{0.999}$$

$$\boxed{I_2 = 5561.11111 \text{ units}}$$

$$(I) \Rightarrow I_4 = I_2 \cdot d_2 = 5561.11111 \times 0.05$$

$$\boxed{I_4 = 278.0555 \text{ units}}$$

$\because I_2 = O_1$

So,

$$O_1 = I_1 (1-d_1)$$

$$I_1 = \frac{O_1}{(1-d_1)}$$

$$I_1 = \frac{5561.11111}{1-0.05}$$

$$I_1 = 5853.801168 \text{ units}$$

Total / overall output we have given But the Input at the start is;

$$I_1 = \frac{O_{total}}{(1-d_1)\underbrace{[(1-d_2)+d_2(1-d_4)]}(1-d_3)}$$

As considering the eq (C) i.e rework equation.

$$I_1 = \frac{5000}{(1-0.05)[(1-0.05)+0.05(1-0.02)](1-0.1)}$$

$$I_1 = 5853.801168 \text{ units}$$

ASSIGNMENT

IFD Chap2 & Chap3

Group#03.

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Q 2.19

Given the following, what are machine factor fractions for m/c A, B, C to produce Parts X & Y?

	M/c A	M/c B	M/c
Part X Std. time	0.15 hr	0.25 hr	0.1 hr
Part Y Std. time	0.10 hr	0.10 hr	0.15 hr
Part X defect estimate	5%	4%	5%
Part Y defect estimate	5%	4%	3%
Historical effeciency	85%	90%	95%
Reliability factor	95%	90%	85%
Equipment Avail.	1600 hr/yr	1600 hr/yr	1600 hr/yr

Part X [A] → [B] → [C] = 100,000 parts.

Part Y [B] → [A] → [C] = 200,000 parts

Setup time for X = 20 min; Y = 40 min.

Solution:

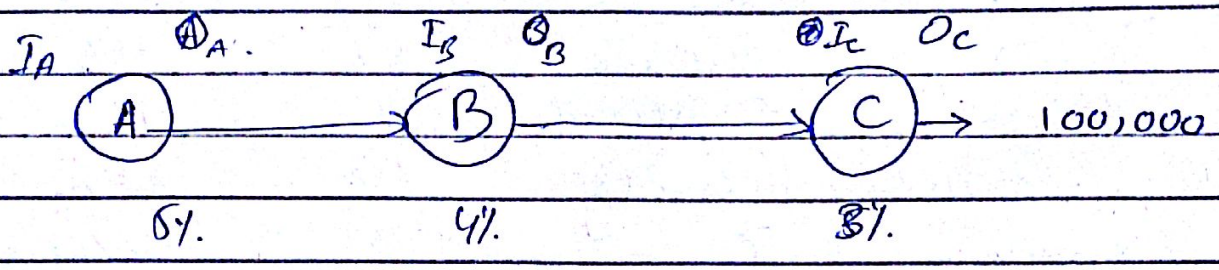
M/c Fraction = $\frac{SQ}{EHR}$.

We need 100,000 part/yr at Part X process at C, So we will calculate inputs to C, B & A and output of A & B using defect rate.

Process X

A → B → C

$I_C = \frac{O_C}{1-d_C}$



$I_B = \frac{O_B}{1-d_B}$

$= \frac{103092.783}{1-0.04}$

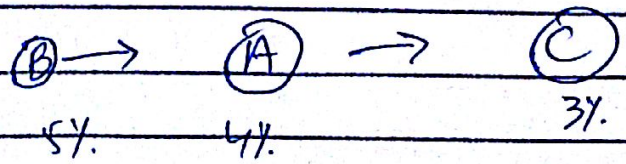
$O_A = I_B = 107388.22$ parts

$I_C = \frac{O_C}{1-d_C} = \frac{100,000}{1-0.03}$

$O_B = I_C = 103,092.783$ Parts

$I_A = \frac{O_A}{1-d_A} = \frac{107388.22}{1-0.05} = 113040.2$ parts.

Process Y



$I_A = \frac{O_A}{1-d_A}$

$= \frac{214776.56}{1-0.05}$

$= 226080.526$ parts

$I_B = \frac{O_B}{1-d_B}$

$= \frac{206185.56}{1-0.04}$

$= 214776.56$ parts

$I_c = \frac{O_c}{1-d_c} = \frac{200,000}{1-0.03}$

$= 206185.567$ parts

Mc Fraction Part x

A	B	C
$F_A = \frac{SQ}{EHR}$	$F_B = \frac{SQ}{EHR}$	$F_c = \frac{SQ}{EHR}$
$= \frac{0.15 \times 113402}{(0.85)(1600)(0.95)}$	$= \frac{107388.2 \times 0.25}{(0.9)(1600)(0.9)}$	$= \frac{103092.783 \times 0.1}{(0.95)(1600)(0.85)}$
$F_A = 13.12$ m/c/shift	$= 20.71$ m/c/shift	$= 7.973$ m/c/shift

Mc Fraction Part y.

A	B	C
$F_A = \frac{SQ}{EHR}$	$F_B = \frac{SQ}{EHR}$	$F_c = \frac{SQ}{EHR}$
$\frac{0.10 \times 226080.526}{(0.85)(0.95)(1600)}$	$\frac{0.10 \times 214776.5}{(1600)(0.9)(0.9)}$	$\frac{0.15 \times 206185.5}{(1600) \times (0.85 \times (0.95)}$
$= 17.49$ m/c/shift	$= 16.57$ m/c/shift	$= 23.93$ m/c/shift

Q3.27

Part #	M\C # 1	2	3	4
1	1	1		1
2	1		1	
3				1
4			1	
5	1	1		

Step 1

Part #	M\C # 1	2	3	4	
1	1	1		1	3
5	1	1			2
2	1		1		2
4			1		1
3				1	1
	3	2	2	2	

It is the best possible answer

- GROUP # 01:-

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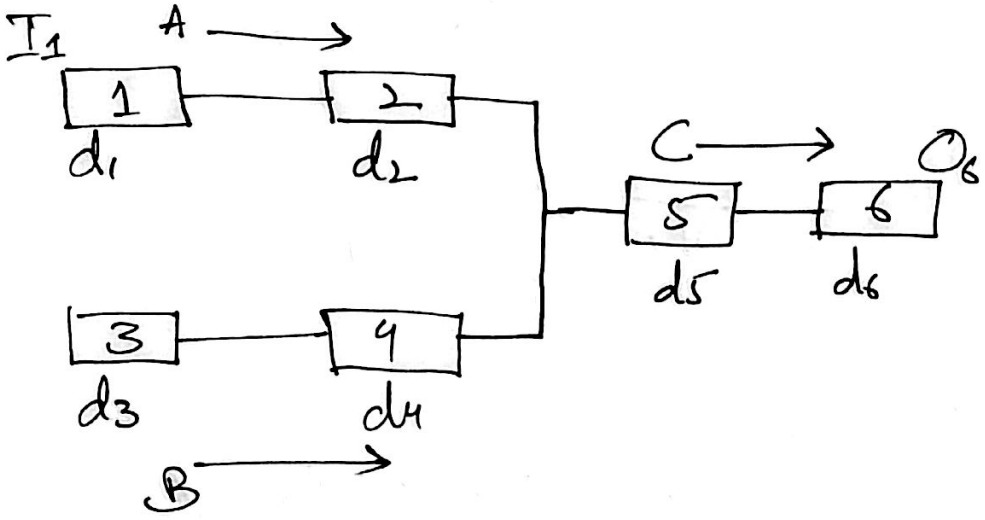
:)

Part A is Produced in machines 1 and 2. Part B is Produced in machines 3 and 4. Parts A and B are assembled in workstation 5 to create C. Assembly C is painted in Process 6.



$$I_1 = \frac{O_1}{1-d_1} \qquad I_2 = \frac{O_2}{1-d_2}$$

$$I_3 = \frac{O_3}{1-d_3} \qquad I_4 = \frac{O_4}{1-d_4}$$

$$I_5 = \frac{O_5}{1-d_5} \qquad O_2 = O_4$$

$$I_5 = O_2 + O_4$$

$$O_6 = I_6(1-d_6)$$

$$I_5 = \frac{O_6}{(1-I_6)(1-I_5)}$$

$$2O_2 = \frac{O_6}{(1-d_6)(1-d_5)}$$

$$2O_2 = \frac{O_6}{(1-d_6)(1-d_5)}$$

$$2I_2(1-d_2) = \frac{O_6}{(1-d_6)(1-d_5)}$$

$$2O_1 = \frac{O_6}{(1-d_2)(1-d_5)(1-d_6)}$$

$$2I_1(1-d_1) = \frac{O_6}{(1-d_2)(1-d_5)(1-d_c)}$$

$$I_1 = \frac{O_6}{2(1-d_1)(1-d_2)(1-d_5)(1-d_6)}$$

Group # 01

Q. - 3.25: Form cells using direct clustering Algorithm.

	1	2	3	4	5	6
1					1	1
2	1			1		
3			1			1
4	1	1				
5	1					
6					1	1
7		1		1		
8			1			1

Step I:

Arranging rows & colums on the basis of No. of 1's.

	2	3	4	5	1	6	
1				1		1	2
2			1		1		2
3		1	1	1		1	2
4	1				1		2
6				1		1	2
7	1		1				2
8		1				1	2
5					1		1
	2	2	2	2	3	4	

Step II:

Shift columns to left having 1 at first row.

	6	5	1	4	3	2	
1	1	1					2
2			1	1			2
3	1				1		2
4			1			1	2
6	1	1					2
7				1		1	2
8	1				1		2
5			1				1
	4	2	3	2	2	2	

Step III:

Shift rows up having 1's in 1st column.

	6	5	1	4	3	2	
1	1	1					2
6	1	1					2
3	1				1		2
8	1				1		2
2			1	1			2
4			1			1	2
5			1				1
7				1		1	2

Step IV:

Rearrange column-3 to form cells.

	6	5	3	1	4	2	
1	1	1					2
6	1	1					2
3	1		1				2
8	1		1				2
2				1	1		2
4				1		1	2
5				1			1
7					1	1	2

ASSIGNMENT

Question 2.16, 3.44

Group #06.

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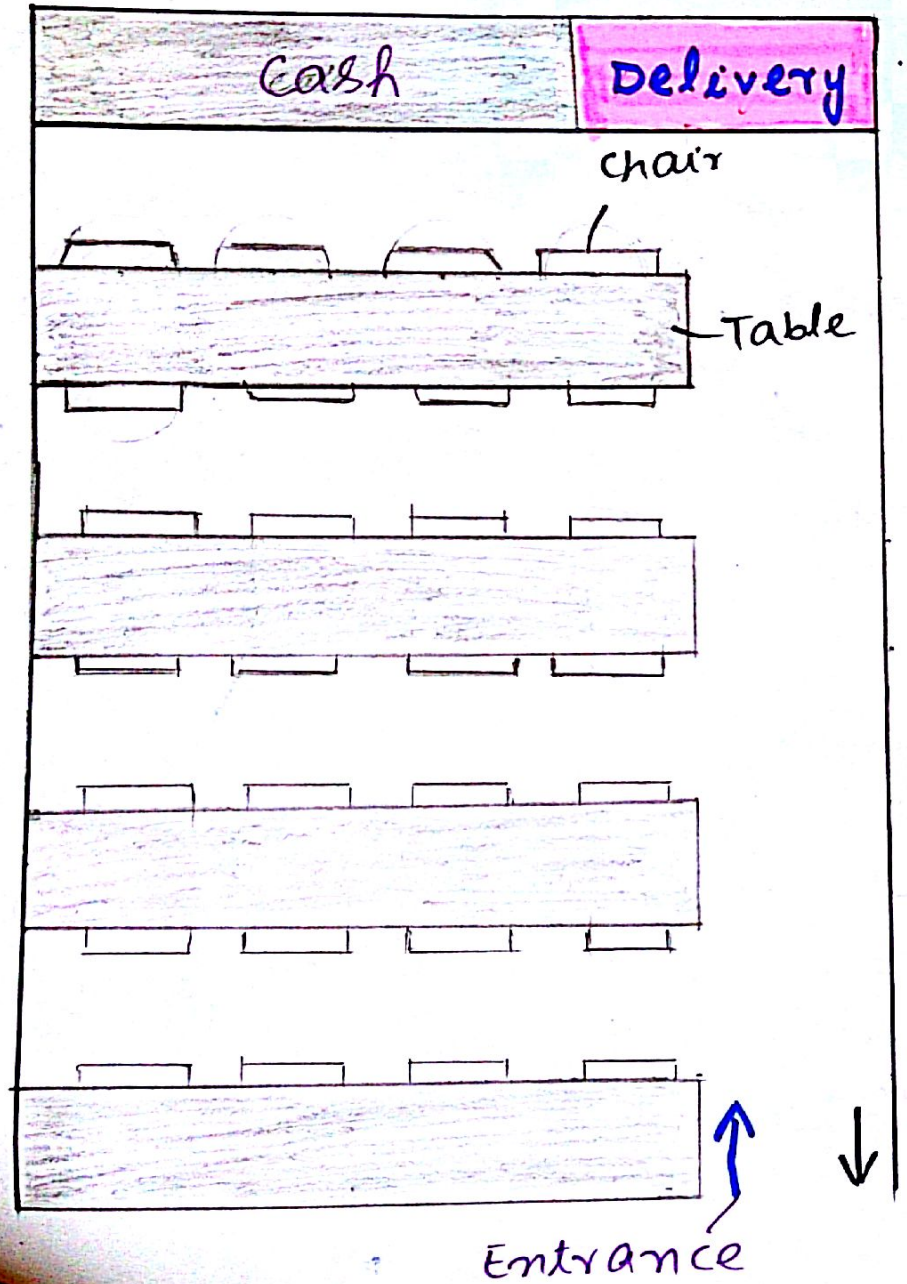
Actual Fast Food Restaurant Lay-out.



Improved Fast Food Restaurant Layout.