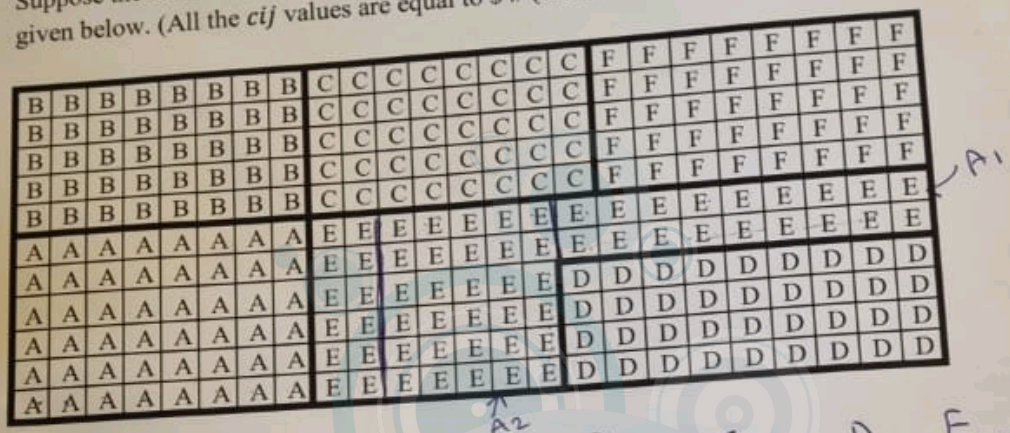
Problem 1:-

Use the following to answer questions (1-6).

Suppose the following layout is provided as the initial layout for CRAFT. The flow-between matrix is given below. (All the *cij* values are equal to $4/ (unite load. unite distance).



Flow-Between Matrix

	A	B	C	D	E	F
A	----	0	80	0	32	0
B		----	0	20	0	8
C			----	0	4	0
D				----	24	0
E					----	16
F						----

	B	C	D	E	F
A	0	1080	0	336	0
B		0	40	0	178
C			0	27.2	0
D				172.8	0
E					176

1. Suppose the following layout is provided as the initial layout to CRAFT. What is the number department pairs that will be considered for exchange that satisfy exchange requirements?

2. What is the cost of the initial layout?

5. What is the estimated layout cost assuming that departments A and E are exchanged?

6. What is the actual layout cost assuming that departments A and E are exchanged?

centroid A, E

E (5, 3)

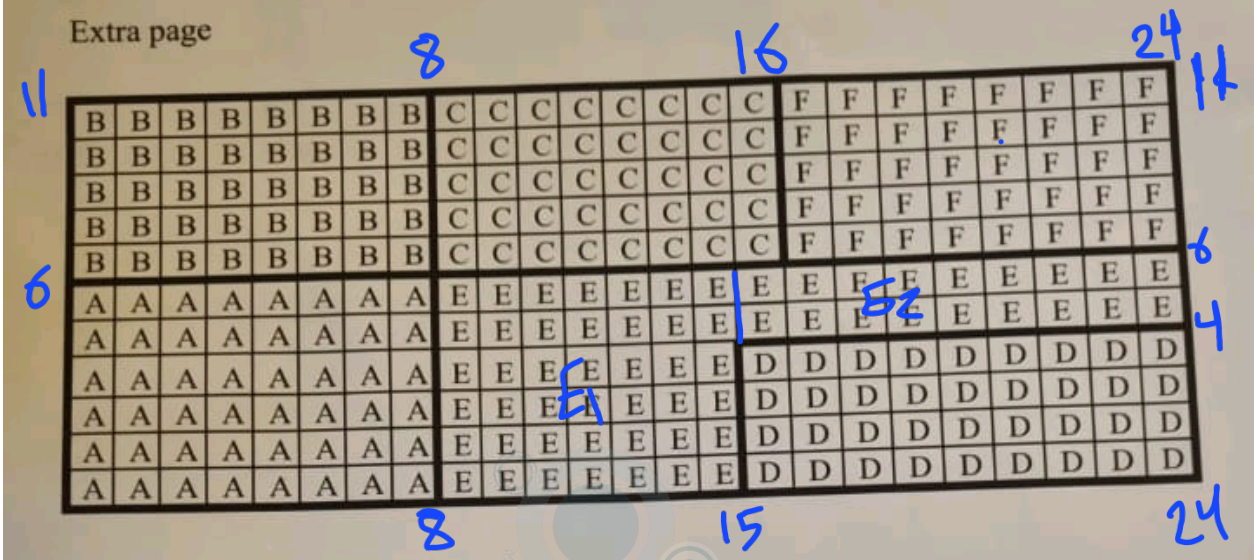
A

	Area	~~X~~	~~Y~~	A_x	A_y
A_1	18	19.5			
A_2	30				

What is the estimated layout cost assuming that departments B and F are exchanged?

4. What is the actual layout cost assuming that departments B and F are exchanged?

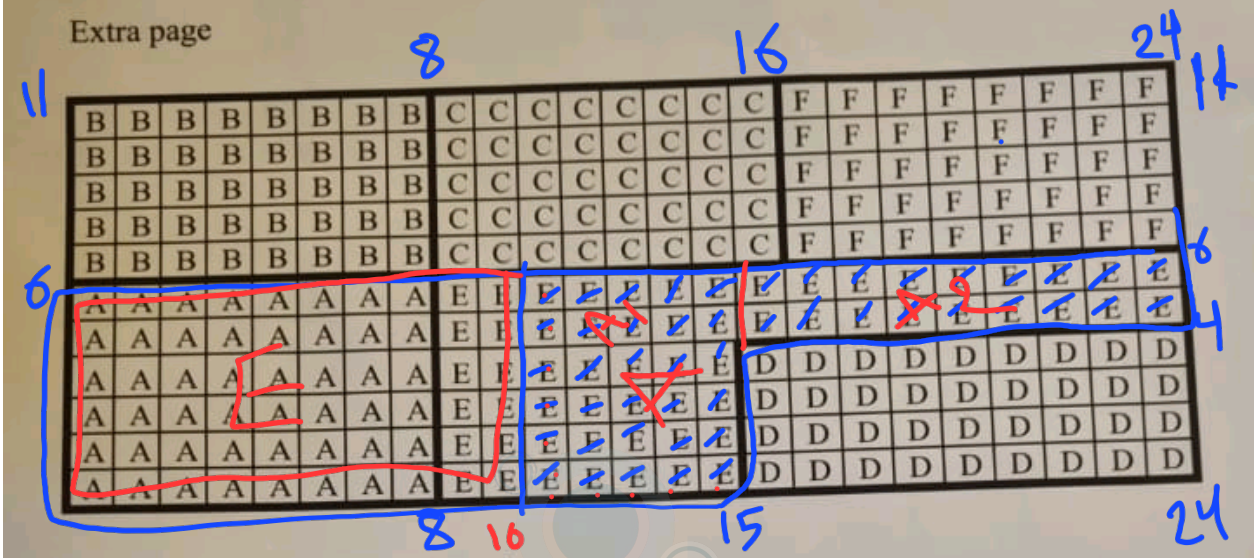
Extra page



Flow-Between Matrix

	A	B	C	D	E	F
A	----	0	80	0	32	0
B		----	0	20	0	8
C			----	0	4	0
D				----	24	0
E					----	16
F						----

Extra page



Flow-Between Matrix

	A	B	C	D	E	F
A	----	0	80	0	32	0
B		----	0	20	0	8
C			----	0	4	0
D				----	24	0
E					----	16
F						----

8 [I] [I] first step

A (4 , 3)

9 B (4 , 8.5)

10 C (12 , 8.5)

11 D (19.5 , 2)

12 E (13.8 , 3.6)

13 F (20 , 8.5)

14

15 E →

16

	A	x	y	Ax	Ay
E1	42	11.5	3	483	126
E2	18	19.5	5	351	90

17

18 $\Sigma A = 60$

19 $\Sigma Ax = 834$

20 $\Sigma Ay = 216$

$x = \frac{\Sigma Ax}{\Sigma A} = 13.9$

$y = \frac{\Sigma Ay}{\Sigma A} = 3.6$

Notes

1

7 Thu'l-hijja 1446 H — 3/6/2025 — ٧ ذو الحجة ١٤٤٦ هـ — الثلاثاء

1. BC/BA/AE/CE/CF/FE

ED/ ⟹ adjacency

BF/ ⟹ same area

# of dep = 8

2

2. TC for initial layout c = 4 $

dis matrix

	A	B	C	D	E	F
A	—	—	13.5	—	10.5	—
B	—	—	—	22	—	16
C			—	—	6.8	—
D				—	7.2	—
E					—	11
F						—

ملاحظات

$TC = \sum\sum f d c = 2360 \times 4 = 9440\$$

THURSDAY

9 Thu'l-hijja 1446 H

5/6/2025

٩ ذو الحجة ١٤٤٦ هـ

3. A & E

A (13.9, 3.6)

B (4, 8.5)

C (12, 8.5)

D (19.5, 2)

E (4, 3)

F (20, 8.5)

	A	B	C	D	E	F
A	-	-	6.8	-	16.5	-
B		-	-	22	-	16
C			-	-	13.5	-
D				-	16.5	-
E					-	21.5
F						-

estimated cost

$= 4 * (2242) = 8968\$$

4. actual cost

E (5, 3)

A (15.125, 3.75)

A	x	y	Ax	Ay
A_1	30	12.5	3	375	90
A_2	18	19.5	5	351	90
	48			726	180

A →

ملاحظات

FRIDAY **6** الجمعة

10 Thu'l-hijja 1446 H 6/6/2025 ١٠ ذو الحجة ١٤٤٦ هـ

	A	B	C	D	E	F
A	—	—	7.875	—	10.875	—
B		—	—	22	—	16
C				—	12.5	—
D				—	15.5	—
E					—	20.5
F						—

SATURDAY **7** السبت

11 Thu'l-hijja 1446 H 7/6/2025 ١١ ذو الحجة ١٤٤٦ هـ

TC = 9184$

• 5+6

لهم نفس الإجابة لانهم من نفس المساحة

وحلهم نفس في 3 موتفصيلا

dep

Problem 2:-

Use the following to answer questions (7&8).

The block layout shown below consists of six departments. given the closeness ratings between pairs of departments in the table at the right of the layout. Use the following numerical values for closeness rating

$A = 4;\ E = 3;\ I = 2;\ O = 1;\ U = 0;\ X = -5.$

	To	1	2	3	4	5	6
From	1	-	O	E	I	O	U
	2		-	U	I	U	U
	3			-	I	A	U
	4				-	A	E
	5					-	U
	6						-

7. What is the adjacency-based score for the current layout?

3 + 2 + 2 + 7 = 14

8. What is the layout efficiency rating for the current layout?

$$\frac{\Sigma f_{ij} x_{ij}}{\Sigma f_{ij}} = \frac{14}{22} = 0.64$$

(+ve / +ve)

1 + 3 + 2 + 1 + 2 + 2 + 4 + 4 + 3 = 22

64 %