

Assignment 2 :-

Question 1

① 4 different chromosomes:-

Objects:-

	A	B	C	D	E	F	G	weight
a)	1	0	1	0	0	0	1	15
b)	0	1	1	1	0	0	0	15
c)	1	0	0	0	0	1	1	14
d)	1	1	1	0	1	1	0	15

2) fitness function based on Profit

For a) $1010001 = 10 + 5 + 8 = 23$

b) $011000 = 5 + 15 + 7 = 27$

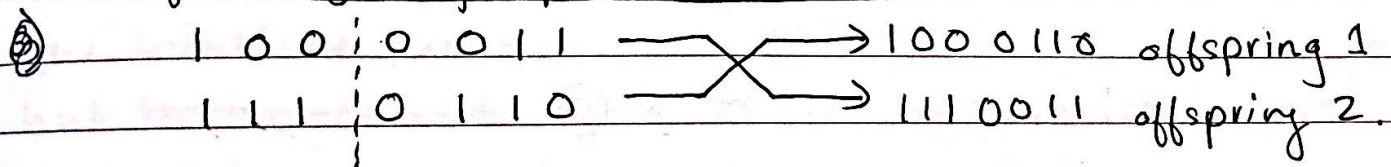
c) $1000011 = 10 + 18 + 10 = 38$ ✓

d) $1110110 = 10 + 5 + 15 + 6 + 18 = 54$ ✓

2 fittest ones are

① i. ~~2 fittest ones are~~ (c) & (d)

3) Performing single point crossover:-



4) Performing mutation:-

	Profit
$10\overset{0}{\boxed{0}}011\boxed{0} \rightarrow 10001101 = 10 + 6 + 18 + 10 = 44$	
$1\boxed{1}10011 \rightarrow 1010011 = 10 + 15 + 18 + 10 = 53$	

② ~~2 fittest ones~~ offspring 1 → fitness = 44

offspring 2 → " = 53

Question 3

1) ~~cities~~ cities

~~Encoding~~ Encoding

A	000
B	001
C	010
D	100
E	101
F	110
A	000

3 different chromosomes:-

a) $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$ ~~000001010100101110~~

000001010100101110

b) ~~B~~ $B \rightarrow F \rightarrow D \rightarrow E \rightarrow C \rightarrow A$

001110100101010000

d) $A \rightarrow C \rightarrow F \rightarrow E \rightarrow D \rightarrow B$

000010110101100001

2) For fitness function, I will consider the ~~path~~ least path cost.

a) $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F = 2 + 3 + 3 + 1 + 4 = 13$ ✓

b) $B \rightarrow F \rightarrow D \rightarrow E \rightarrow C \rightarrow A = 15 + 6 + 1 + 6 + 4 = 32$ ✓

c) $A \rightarrow C \rightarrow F \rightarrow E \rightarrow D \rightarrow B = 4 + 11 + 9 + 6 + 5 = 35$ ✓

Two fittest ~~ance~~ ~~ance~~ are (a) & (c)

3) Cross over:-

000	001	010		100	101	110	→	000	001	010		100	101	110
000	010	110		101	100	001	→	000	010	110		100	101	110

offspring 1 $\rightarrow A \rightarrow B \rightarrow C \rightarrow E \rightarrow D \rightarrow B$

2 $\rightarrow A \rightarrow C \rightarrow F \rightarrow D \rightarrow E \rightarrow A$

~~They are not exactly~~

One of them is eligible and the other one is not since the other one does not ~~fine~~ meet the condition of two conditions:-

i.) visiting every city once. only.

ii.) ~~are~~ visiting all 6 cities.

4.) Choosing \rightarrow (a) 000 001 010 100 101 110

i.) Genes ~~are~~ are 000, 001, 010, 100, 101, 110

ii.) Chromosome ~~are~~ :- 0000101010010110.

Question 3

1) Yes, because ~~it~~ it searches for a ~~pop~~ population of points and not a single point. Also genetic algorithm supports ~~optimization~~ multi-objective optimization.

2) Initial population weight.

	M	N	O	P	Q	R
(a)	1	0	1	1	0	1
(b)	1	1	0	1	1	0
(c)	1	1	1	0	1	1
(d)	0	0	1	1	0	0

21

20

19

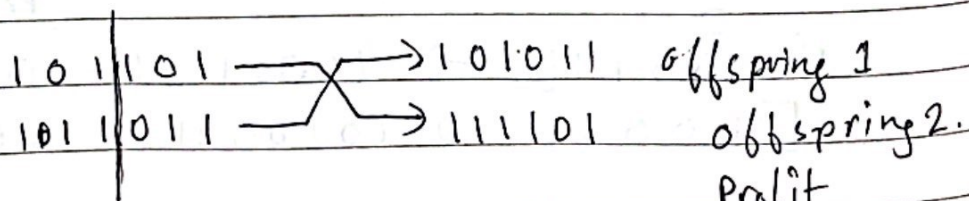
19.

3) Region with fittest 2 chromosome:-

	<u>Profit</u>
For (a) 101101	35 ✓
(b) 110110	28
(c) 111011	39 ✓
(d) 001110	28

two fittest ones are:- (a) & (c)

4) Crossover & mutation



Profit

101101 → 100011 → 10 + 6 + 3 = 19
111101 → 111111 → 46

∴ offspring 2 is the most fittest.