Unit - 3 :

1) optimal Binary Search Tree :

Formula :

$$c(i, k-1) + c(k+1, j) + \sum_{s=i}^{j} ps$$

Problem :-

(do, if, int, while) = [0.1, 0.2, 0.4, 0.3]

a[i]	1	2	3	4
p[i]	0.1	0.2	0.4	0.3

soln :

Cost Table

j → 0 to n.

i (1 to n+1)

Root Table.

soln: $c(i, k-1) + c(k+1, j) + \sum_{s=i}^{j} ps$

Cost Table

Root Table

$i \to 0$ to n.

i 1 to $n+1$

	0	1	2	3	4
1	0	0.1	0.4	1.1	1.7
2		0	0.2	0.8	1.4
3			0	0.4	1.0
4				0	0.3
5					0

	1	2	3	4
1	1	2	3	3
2		2	3	3
3			3	3
4				4

$i = 1, j = 2, k = 1, 2$.

1) i) $c(1,2) = c(i, k-1) + (ik+1, j) + \sum_{s=i}^{j} ps$

$= c(1, 1-1) + (1+1, 2) + p(1) + p(2)$.

$= c(1,0) + (2,2) + 0.1 + 0.2$.

$= 0 + 0.2 + 0.1 + 0.2 \Rightarrow 0.5$

$k = 2$.

ii) $c(1,2) = c(1, 2-1) + (2+1, 2) + 0.3$

$= 0.1 + 0 + 0.3 \Rightarrow 0.4$.

2) i) $c(2,3) = c(2, 2-1) + (2+1, 3) + p(2) + p(2)$ $i=2, j=3, k=2$.

$= c(2,1) + (3,3) + 0.2 + 0.4.$

$= 0 + 0.4 + 0.6 \Rightarrow 1.0.$

$k=3.$

ii) $c(2,3) = c(2, 3-1) + (3+1, 3) + 0.6.$

$= c(2,2) + (4,3) + 0.6.$

$= 0.2 + 0 + 0.6 \Rightarrow 0.8.$ ✓

$i=3, j=4, k=3.$

3). i) $c(3,4) = c(i, k-1) + (k+1, j) + p(3) + p(4)$

$= c(3, 3-1) + (3+1, 4) + 0.4 + 0.3$

$= c(3,2) + (4,4) + 0.7.$

$= 0 + 0.3 + 0.7 = 1.0$ ✓.

$k=4.$

ii) $c(3,4) = c(3, 4-1) + (4+1, 4) + 0.7.$

$= c(3,3) + (5,4) + 0.7.$

$= 0 + 1.1$

111 by for all steps.

root table = (1, $) = 3..

(do, if, int, while)