DAA LAB

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Practical 6

CODE:

```
def OptimalBST(p, q, n):
    E = [[0 for _ in range(n + 1)] for _ in range(n + 1)]
    W = [[0 for _ in range(n + 1)] for _ in range(n + 1)]
    R = [[0 for _ in range(n + 1)] for _ in range(n + 1)]

    for i in range(n + 1):
        E[i][i] = q[i]
        W[i][i] = q[i]
        R[i][i] = 0
    for d in range(1, n + 1):
        for i in range(0, n - d + 1):
            j = i + d
            E[i][j] = float('inf')
            W[i][j] = W[i][j - 1] + p[j - 1] + q[j]
            for k in range(i + 1, j + 1):
                cost = E[i][k - 1] + E[k][j] + W[i][j]
                if cost < E[i][j]:
                    E[i][j] = cost
                    R[i][j] = k
    return E, W, R

n = int(input("Enter number of book IDs: "))
keys = list(map(int, input("Enter sorted book IDs: ").split()))
p = list(map(float, input("Enter  (p[i]): ").split()))
q = list(map(float, input("Enter  (q[i]): ").split()))
E, W, R = OptimalBST(p, q, n)
print(f"\nMinimum expected cost of OBST: {E[0][n]:.4f}")
```

Output:

```
Enter number of book IDs: 4
Enter sorted book IDs: 10 20 30 40
Enter  (p[i]): 0.1 0.2 0.4 0.3
Enter  (q[i]): 0.05 0.1 0.05 0.05 0.1

Minimum expected cost of OBST: 2.9000
```

Task-2: