Experiment No: 04

Experiment Name: Bellman Ford

Code:

```
def bellman_ford(graph, vertices, source):
    # Initialize distances
    dist = [float('inf')] * vertices
    dist[source] = 0

    # Relax edges
    for _ in range(vertices - 1):
        for u in range(vertices):
            for v in range(vertices):
                if graph[u][v] != float('inf') and dist[u] + graph[u][v] < dist[v]:
                    dist[v] = dist[u] + graph[u][v]

    # Check for negative-weight cycles
    for u in range(vertices):
        for v in range(vertices):
            if graph[u][v] != float('inf') and dist[u] + graph[u][v] < dist[v]:
                print("Graph contains a negative-weight cycle.")
                return

    # Print results
    print("Vertex\tDistance from Source")
    for i in range(vertices):
        if dist[i] == float('inf'):
            print(f"{i}\tINF")
        else:
            print(f"{i}\t{dist[i]}")
```

```
if __name__ == "__main__":
    vertices = 5
    graph = [[float('inf')] * vertices for _ in range(vertices)]

    # Example graph
    graph[0][1] = -1
    graph[0][2] = 4
    graph[1][2] = 3
    graph[1][3] = 2
    graph[1][4] = 2
    graph[3][2] = 5
    graph[3][1] = 1
    graph[4][3] = -3

    source = 0
    bellman_ford(graph, vertices, source)
```

Output:

```
Vertex  Distance from Source
0       0
1       -1
2       2
3       -2
4       1
```