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Roll No. – 31

Class – A4/B2

### **Practical-7**

Aim: Implement Hamiltonian Cycle using Backtracking.

CODE:-

```
public class HamiltonianCycle {
    final int V = 5;
    int path[];

    boolean isSafe(int v, int graph[][], int path[], int pos) {
        if (graph[path[pos - 1]][v] == 0)
            return false;
        for (int i = 0; i < pos; i++)
            if (path[i] == v)
                return false;
        return true;
    }

    boolean hamCycleUtil(int graph[][], int path[], int pos) {
        if (pos == V) {
            if (graph[path[pos - 1]][path[0]] == 1)
                return true;
            else
                return false;
        }
        for (int v = 1; v < V; v++) {
            if (isSafe(v, graph, path, pos)) {
                path[pos] = v;
                if (hamCycleUtil(graph, path, pos + 1))
                    return true;
                path[pos] = -1;
            }
        }
    }
}
```

```

    }
    return false;
}

```

```

boolean hamCycle(int graph[][]) {
    path = new int[V];
    for (int i = 0; i < V; i++)
        path[i] = -1;
    path[0] = 0;
    if (!hamCycleUtil(graph, path, 1)) {
        System.out.println("No Hamiltonian Cycle exists");
        return false;
    }
    printSolution(path);
    return true;
}

```

```

void printSolution(int path[]) {
    System.out.print("Hamiltonian Cycle: ");
    for (int i = 0; i < V; i++)
        System.out.print((char)('A' + path[i]) + " ");
    System.out.println((char)('A' + path[0]));
}

```

```

public static void main(String args[]) {
    HamiltonianCycle h = new HamiltonianCycle();
    int graph1[][] = {
        {0, 1, 1, 0, 1},
        {1, 0, 1, 1, 0},
        {1, 1, 0, 1, 0},
        {0, 1, 1, 0, 1},
        {1, 0, 0, 1, 0}
    };
    int graph2[][] = {
        {0, 1, 1, 0, 1},
        {1, 0, 1, 1, 0},
        {1, 1, 0, 1, 1},
    };
}

```

```
        {0, 1, 1, 0, 1},
        {1, 0, 1, 1, 0}
    };
    System.out.println("Graph 1:");
    h.hamCycle(graph1);
    System.out.println("Graph 2:");
    h.hamCycle(graph2);
}
}
```

A

OUTPUT:-

```
Output
Graph 1:
Hamiltonian Cycle: A B C D E A
Graph 2:
Hamiltonian Cycle: A B C D E A
```