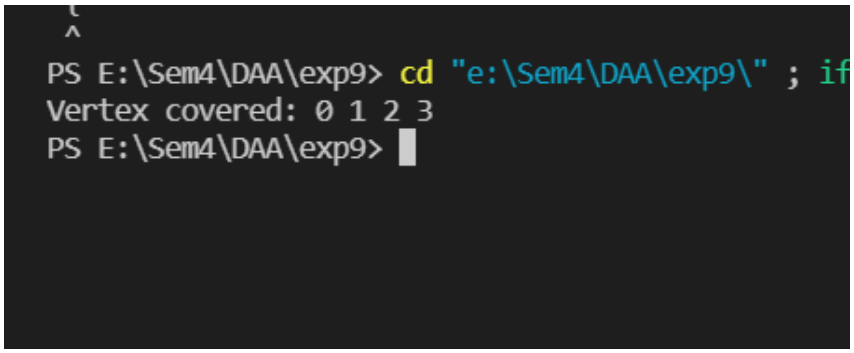
NAME:	Bhavesh Prashant Chaudhari
UID:	2021300018
SUBJECT	DAA
EXPERIMENT NO :	09
AIM:	To implement approximate algorithm for vertex cover problem.
PROBLEM STATEMENT 1:	
THEORY	A vertex cover of an undirected graph is a subset of its vertices such that for every edge (u, v) of the graph, either 'u' or 'v' is in the vertex cover. Although the name is Vertex Cover, the set covers all edges of the given graph. Given an undirected graph, the vertex cover problem is to find minimum size vertex cover. Consider all the subset of vertices one by one and find out whether it covers all edges of the graph. For eg. in a graph consisting only 3 vertices the set consisting of the combination of vertices are:{0,1,2,{0,1},{0,2},{1,2},{0,1,2}} . Using each element of this set check whether these vertices cover all the edges of the graph. Hence update the optimal answer. And hence print the subset having minimum number of vertices which also covers all the edges of the graph.
ALGORITHM	C={} while E is not empty pick any {u, v} that belongs to E C = C U {u, v} delete all edges incident to either u or v return C

PROGRAM:

```
#include<iostream>
#include <list>
using namespace std;

class Graph
{
   int V;
   list<int> *adj;
public:
   Graph(int V);
   void addEdge(int v, int w);
   void printVertexCover();
};

Graph::Graph(int V)
{
   this->V = V;
   adj = new list<int>[V];
}

void Graph::addEdge(int v, int w)
{
   adj[v].push_back(w);
   adj[w].push_back(v);
}

void Graph::printVertexCover()
{
   bool visited[V];
   for (int i=0; i<V; i++)
       visited[i] = false;

   list<int>::iterator i;
```

```
    for (int u=0; u<V; u++)
    {
        if (visited[u] == false)
        {
            for (i= adj[u].begin(); i != adj[u].end(); ++i)
            {
                int v = *i;
                if (visited[v] == false)
                {
                    visited[v] = true;
                    visited[u]  = true;
                    break;
                }
            }
        }
    }

    for (int i=0; i<V; i++)
        if (visited[i])
          cout << i << " ";
}

int main()
{
    Graph g(5);
    g.addEdge(0, 1);
    g.addEdge(0, 2);
    g.addEdge(1, 3);
    g.addEdge(2, 3);
    g.addEdge(3, 4);
    cout << "Vertex covered: ";
    g.printVertexCover();

    return 0;
```

	}
RESULT (SNAPSHOT)  	
CONCLUSION:	Through this experiment I understood the concept of approximate algorithms and how to it can be used to solve vertex source problem in polynomail time.