Program 9a

Write a program to traverse a graph using BFS method.

Code:

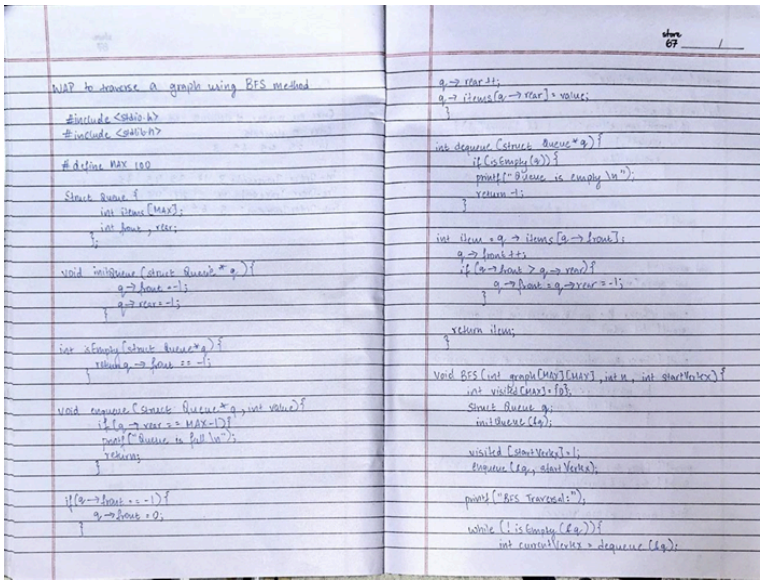
```
#include <stdio.h>
#include <stdlib.h>
#define MAX 100
struct Queue {
        int items[MAX];
        int front, rear;
};
void initQueue(struct Queue* q) {
   q->front = -1;
   q->rear = -1;
}
int isEmpty(struct Queue* q) {
        return q->front == -1;
}
void enqueue(struct Queue* q, int value) {
        if (q->rear == MAX - 1) {
      printf("Queue is full\n");
      return;
        }
```

```
        if (q->front == -1) {
        q->front = 0;
        }
    q->rear++;
    q->items[q->rear] = value;
}
 int dequeue(struct Queue* q) {
        if (isEmpty(q)) {
        printf("Queue is empty\n");
        return -1;
        }
        int item = q->items[q->front];
    q->front++;
        if (q->front > q->rear) {
        q->front = q->rear = -1;
        }
        return item;
}
 void BFS(int graph[MAX][MAX], int n, int startVertex) {
        int visited[MAX] = {0};
        struct Queue q;
    initQueue(&q);
```

```
    visited[startVertex] = 1;
    enqueue(&q, startVertex);
    printf("BFS Traversal: ");
            while (!isEmpty(&q)) {
        int currentVertex = dequeue(&q);
        printf("%d ", currentVertex);
             for (int i = 0; i < n; i++) {
            if (graph[currentVertex][i] == 1 && !visited[i]) {
                visited[i] = 1;
                enqueue(&q, i);
            }
            }
            }
    printf("\n");
}
 int main() {
            int graph[MAX][MAX], n, startVertex;
  printf("Enter the number of vertices in the graph: ");
    scanf("%d", &n);
  printf("Enter the adjacency matrix of the graph:\n");
            for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            scanf("%d", &graph[i][j]);
```

```
        }
        }
printf("Enter the starting vertex (0 to %d): ", n - 1);
   scanf("%d", &startVertex);
BFS(graph, n, startVertex);
return 0;
}
```

```
Enter the number of vertices in the graph: 4
Enter the adjacency matrix of the graph:
0 1 0 0
1 0 1 1
0 1 0 1
0 1 1 0
Enter the starting vertex (0 to 3): 0
BFS Traversal: 0 1 2 3
```



```
printf("%d ", currentVertex);

for(int i=0; i<n; i++){
    if(graph[currentVertex][i]==1 && !visited[i]){
        visited[i]=1;
        enqueue(&q,i);
    }
}
printf("\n");
}

int main(){
    int graph[MAX][MAX], n, startVertex;

    printf("Enter the no of vertices in the graph:");
    scanf("%d",&n);

    printf("Enter the adjacency matrix of the graph:\n");
    for(int i=0; i<n; i++){
        for(int j=0; j<n; j++){
            scanf("%d", &graph[i][j]);
        }
    }

    printf("Enter the starting vertex (0 to %d):", n-1);
    scanf("%d", &startVertex);

    BFS(graph, n, startVertex);

    return 0;
}
```

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Output

```
Enter the number of vertices in the graph: 4
Enter the adjacency matrix of the graph:
0 1 0 0
1 0 1 1
0 1 0 1
0 1 1 0
Enter the starting vertex (0 to 3): 0
BFS Traversal : 0 1 2 3
```