Assignment No 2 :- Write a program to implement Huffman Encoding using a greedy strategy

Code:-

```
#include <bits/stdc++.h>
using namespace std;

struct MinHeapNode {
    char data;
    unsigned freq;
    MinHeapNode *left, *right;

    MinHeapNode(char data, unsigned freq) {
        left = right = NULL; this->data = data;
        this->freq = freq;
    }
};

struct compare {
    bool operator()(MinHeapNode* l, MinHeapNode* r) {
        return (l->freq > r->freq);
    }
};

void printCodes(struct MinHeapNode* root, string str)
    { if (!root) return;

    if (root->data != '$')
        cout << root->data << ": " << str << "\n";

    printCodes(root->left, str + "0"); printCodes(root-
    >right, str + "1");
}


void HuffmanCodes(char data[], int freq[], int size) {
    struct MinHeapNode *left, *right, *top; priority_queue<MinHeapNode*,

    vector<MinHeapNode*>, compare> minHeap;

    for (int i = 0; i < size; ++i)
```

```
        minHeap.push(new MinHeapNode(data[i], freq[i]));
    while (minHeap.size() != 1) {

        left = minHeap.top();
        minHeap.pop();

        right = minHeap.top(); minHeap.pop(); top = new
        MinHeapNode('$', left->freq + right->freq);

        top->left = left; top-
        >right = right;

        minHeap.push(top);
    }

    cout<<"\n**************************************************\n";
    cout<<"Huffman Code: "<<endl;
    printCodes(minHeap.top(), "");
}

int main() {
    int n; cout << "Enter the number of
    characters: "; cin >> n;

    char* arr = new char[n];
    int* freq = new int[n];

    cout << "Enter the characters and their frequencies:\n\n";
    for (int i = 0; i < n; ++i) {
        cout << "Character " << i + 1 << ": ";
        cin >> arr[i];
        cout << "Frequency " << i + 1 << ": ";
        cin >> freq[i];
    }

    HuffmanCodes(arr, freq, n);

    delete[] arr;
    delete[] freq;

    return 0;
}
```

Output :-

```
Enter the number of characters: 6
Enter the characters and their frequencies:

Character 1: a
Frequency 1: 5
Character 2: b
Frequency 2: 9
Character 3: c
Frequency 3: 12
Character 4: d
Frequency 4: 13
Character 5: e
Frequency 5: 16
Character 6: f
Frequency 6: 45

**************************************************
Huffman Code:
f: 0
c: 100
d: 101
a: 1100
b: 1101
e: 111

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Process exited after 21.45 seconds with return value 0
Press any key to continue . . .
```