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**Roll no: COB249**

**Code :**

#include <iostream>

#include <math.h>

using namespace std;

#define max1 20

class stud {

public:

    int marks[max1], total;

    stud() {

        for (int i = 0; i < max1; i++)

            marks[i] = 0;

    }

    void createHeap();

    void displayHeap();

    void showmax();

    void showmin();

};

void stud::createHeap() {

    int i, j, par, temp, M;

    cout << "\nEnter How many Students: ";

    cin >> total;

    for (i = 0; i < total; i++) {

        cout << "\nEnter Marks: ";

        cin >> marks[i];

        M = marks[i];

        j = i; // child

        par = floor((j - 1) / 2);

        while (marks[j] < marks[par] && j != 0) {

            temp = marks[j];

            marks[j] = marks[par];

            marks[par] = temp;

            j = par;

            par = floor((j - 1) / 2);

        }

        cout << "\nCurrent Heap After Inserting: " << M << " is:\n";

        displayHeap();

    }

}

void stud::displayHeap() {

    int i = 0, space = 6;

    cout << endl;

    while (i < total) {

        if (i == 0 || i == 1 || i == 3 || i == 7 || i == 15) {

            cout << endl << endl;

            for (int j = 0; j < space; j++)

                cout << " ";

            space -= 2;

        }

        cout << " " << marks[i];

        i++;

    }

    cout << endl;

}

void stud::showmin() {

    cout << "\nMinimum Marks: " << marks[0] << endl;

}

void stud::showmax() {

    int max = marks[0];

    for (int i = 1; i < total; i++) {

        if (max < marks[i])

            max = marks[i];

    }

    cout << "\nMaximum Marks: " << max << endl;

}

int main() {

    stud s1;

    int ch, ans;

    do {

        cout << "\n1. Insert Marks";

        cout << "\n2. Display Marks";

        cout << "\n3. Show Max Marks";

        cout << "\n4. Show Min Marks";

        cout << "\n\nEnter Your Choice: ";

        cin >> ch;

        switch (ch) {

            case 1: s1.createHeap(); break;

            case 2: s1.displayHeap(); break;

            case 3: s1.showmax(); break;

            case 4: s1.showmin(); break;

            default: cout << "\nInvalid Choice!";

        }

        cout << "\nDo you want to continue? (1 for yes): ";

        cin >> ans;

    } while (ans == 1);

    return 0;

}

**Output :**

1. Insert Marks

2. Display Marks

3. Show Max Marks

4. Show Min Marks

Enter Your Choice: 1

Enter How many Students: 5

Enter Marks: 12

Current Heap After Inserting: 12 is:

12

0 0

0 0

Enter Marks: 15

Current Heap After Inserting: 15 is:

12

15 0

0 0

Enter Marks: 16

Current Heap After Inserting: 16 is:

12

15 16

0 0

Enter Marks: 16

Current Heap After Inserting: 16 is:

12

15 16

16 0

Enter Marks: 17

Current Heap After Inserting: 17 is:

12

15 16

16 17

Do you want to continue? (1 for yes): 1

1. Insert Marks

2. Display Marks

3. Show Max Marks

4. Show Min Marks

Enter Your Choice: 2

12

15 16

16 17

Do you want to continue? (1 for yes): 1

1. Insert Marks

2. Display Marks

3. Show Max Marks

4. Show Min Marks

Enter Your Choice: 3

Maximum Marks: 17

Do you want to continue? (1 for yes): 1

1. Insert Marks

2. Display Marks

3. Show Max Marks

4. Show Min Marks

Enter Your Choice: 4

Minimum Marks: 12

Do you want to continue? (1 for yes):

n