

Name: Zeeshan Ali

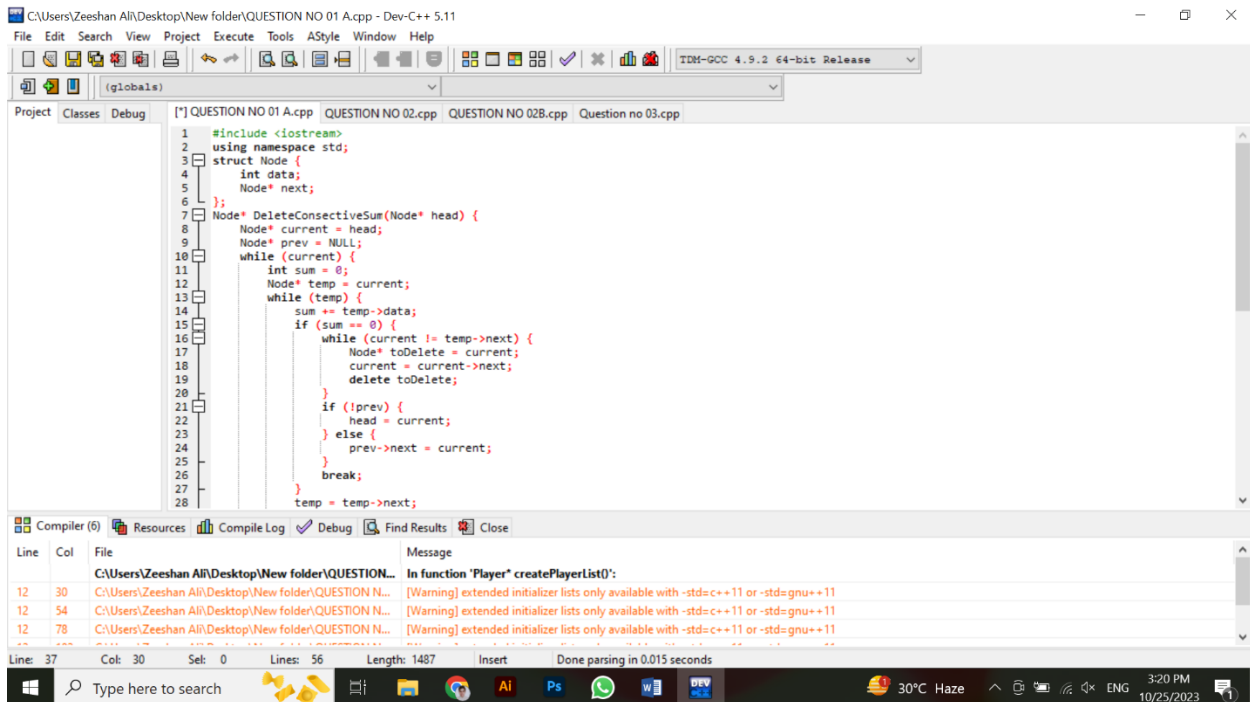
Roll No: SU92-BSITM-F22-019

## DSA(Lab) Assignment # 02

Question No 02:

(a)

Code:



The screenshot shows a C++ IDE with the following code in the main editor:

```
1 #include <iostream>
2 using namespace std;
3 struct Node {
4     int data;
5     Node* next;
6 };
7 Node* DeleteConsecutiveSum(Node* head) {
8     Node* current = head;
9     Node* prev = NULL;
10    while (current) {
11        int sum = 0;
12        Node* temp = current;
13        while (temp) {
14            sum += temp->data;
15            if (sum == 0) {
16                while (current != temp->next) {
17                    Node* toDelete = current;
18                    current = current->next;
19                    delete toDelete;
20                }
21                if (!prev) {
22                    head = current;
23                } else {
24                    prev->next = current;
25                }
26                break;
27            }
28            temp = temp->next;
29        }
30        prev = current;
31        current = current->next;
32    }
33    return head;
34 }
```

The IDE also shows a compiler window with the following messages:

Line	Col	File	Message
12	30	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	In function 'Player* createPlayerList0':
12	54	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
12	78	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

The status bar at the bottom indicates: Line: 37, Col: 30, Sel: 0, Lines: 56, Length: 1487, Insert, Done parsing in 0.015 seconds. The system tray shows the date and time as 10/25/2023, 3:20 PM.

C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Classes Debug [?] QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp Question no 03.cpp

```
27     }
28     temp = temp->next;
29 }
30 prev = current;
31 current = current->next;
32 }
33 return head;
34 }
35 void display(Node* head) {
36     Node* current = head;
37     while (current != NULL) {
38         cout << current->data << " -> ";
39         current = current->next;
40     }
41     cout << "nullptr" << endl;
42 }
43 int main() {
44     Node* head = new Node(7, NULL);
45     head->next = new Node(2, NULL);
46     head->next->next = new Node(3, NULL);
47     head->next->next->next = new Node(-3, NULL);
48     head->next->next->next->next = new Node(9, NULL);
49     cout << "Original Linked List: ";
50     display(head);
51     head = DeleteConsecutiveSum(head);
52     cout << "Modified Linked List: ";
53     display(head);
54     return 0;
}
```

Compiler (6) Resources Compile Log Debug Find Results Close

Line	Col	File	Message
12	30	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	In function 'Player* createPlayerList()':
12	54	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
12	78	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 37 Col: 30 Sel: 0 Lines: 56 Length: 1487 Insert Done parsing in 0.015 seconds

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Output:

C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp - [Executing] - Dev-C++ 5.11

File C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.exe

```
Original Linked List: 7 -> 2 -> 3 -> -3 -> 9 -> nullptr
Modified Linked List: 7 -> 2 -> 9 -> nullptr
```

Process exited after 0.1061 seconds with return value 0  
Press any key to continue . . .

Compiler (6) Resources Compile Log Debug Find Results Close

Line	Col	File	Message
44	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	In function 'int main()':
45	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
46	32	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 01 A.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 37 Col: 30 Sel: 0 Lines: 56 Length: 1487 Insert Done parsing in 0.016 seconds

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(b)

## Code:

```
1 #include <iostream>
2
3 using namespace std;
4
5 struct Node {
6     int data;
7     Node* next;
8 };
9
10 void SortInBothOrder(Node** head) {
11     if (*head == NULL || (*head)->next == NULL) {
12         return;
13     }
14
15     Node* slowPtr = *head;
16     Node* fastPtr = (*head)->next;
17
18     while (fastPtr != NULL) {
19         fastPtr = fastPtr->next;
20         if (fastPtr != NULL) {
21             slowPtr = slowPtr->next;
22             fastPtr = fastPtr->next;
23         }
24     }
25
26     Node* firstHalf = *head;
27     Node* secondHalf = slowPtr->next;
28     slowPtr->next = NULL;
29
30     SortInBothOrder(&firstHalf);
31     SortInBothOrder(&secondHalf);
32
33     Node* result = NULL;
34     while (firstHalf != NULL && secondHalf != NULL) {
35         if (firstHalf->data < secondHalf->data) {
36             Node* temp = firstHalf->next;
37             firstHalf->next = result;
38             result = firstHalf;
39             firstHalf = temp;
40         } else {
41             Node* temp = secondHalf->next;
42             secondHalf->next = result;
43             result = secondHalf;
44             secondHalf = temp;
45         }
46     }
47
48     while (firstHalf != NULL) {
49         Node* temp = firstHalf->next;
50         firstHalf->next = result;
51         result = firstHalf;
52         firstHalf = temp;
53     }
54 }
```

```
26 Node* firstHalf = *head;
27 Node* secondHalf = slowPtr->next;
28 slowPtr->next = NULL;
29
30 SortInBothOrder(&firstHalf);
31 SortInBothOrder(&secondHalf);
32
33 Node* result = NULL;
34 while (firstHalf != NULL && secondHalf != NULL) {
35     if (firstHalf->data < secondHalf->data) {
36         Node* temp = firstHalf->next;
37         firstHalf->next = result;
38         result = firstHalf;
39         firstHalf = temp;
40     } else {
41         Node* temp = secondHalf->next;
42         secondHalf->next = result;
43         result = secondHalf;
44         secondHalf = temp;
45     }
46 }
47
48 while (firstHalf != NULL) {
49     Node* temp = firstHalf->next;
50     firstHalf->next = result;
51     result = firstHalf;
52     firstHalf = temp;
53 }
```

C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Classes Debug QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp Question no 03.cpp

```
62 } *head = result;
63 }
64
65 void printList(Node* head) {
66     while (head != NULL) {
67         cout << head->data << " -> ";
68         head = head->next;
69     }
70     cout << "NULL" << endl;
71 }
72
73 int main() {
74     Node* head = new Node(7, NULL);
75     head->next = new Node(2, NULL);
76     head->next->next = new Node(3, NULL);
77     head->next->next->next = new Node(-3, NULL);
78     head->next->next->next->next = new Node(9, NULL);
79
80     Node* current = head;
81     printList(head);
82     SortInBothOrder(&head);
83     printList(head);
84
85     return 0;
86 }
87
88 }
```

Compiler (6) Resources Compile Log Debug Find Results Close

Line	Col	File	Message
		C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	In function 'int main()':
44	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
45	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
46	32	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 88 Col: 1 Sek: 0 Lines: 88 Length: 2015 Insert Done parsing in 0.016 seconds

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## Output:

C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Classes Debug QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp Question no 03.cpp

```
7 -> 2 -> 3 -> -3 -> 9 -> NULL
-3 -> 9 -> 3 -> 7 -> 2 -> NULL

-----
Process exited after 0.07881 seconds with return value 0
Press any key to continue . . .
```

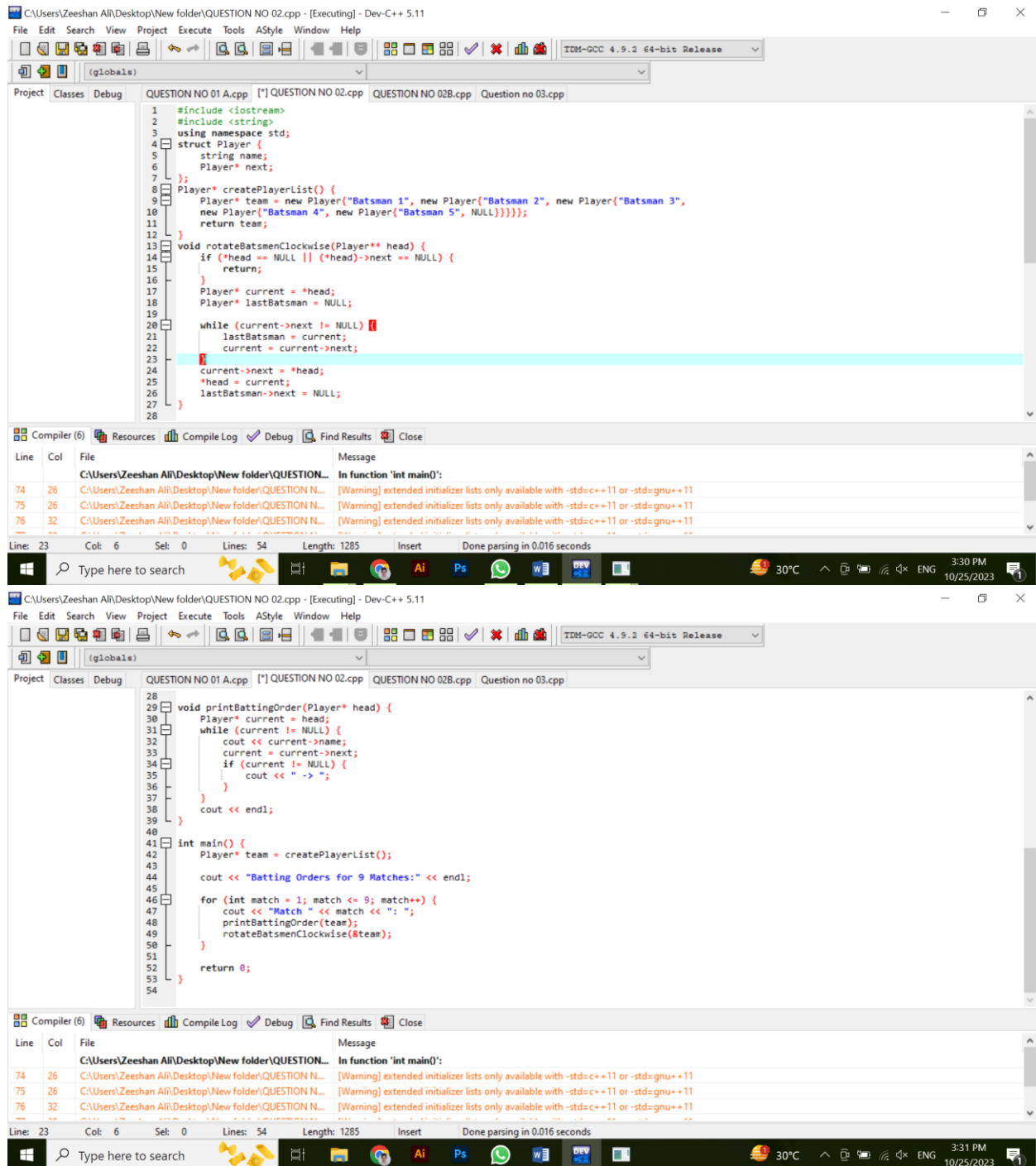
Compiler (6) Resources Compile Log Debug Find Results Close

Line	Col	File	Message
74	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
75	26	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
76	32	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02B.cpp	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 88 Col: 1 Sek: 0 Lines: 88 Length: 2015 Insert Done parsing in 0.016 seconds

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## Question no 03:



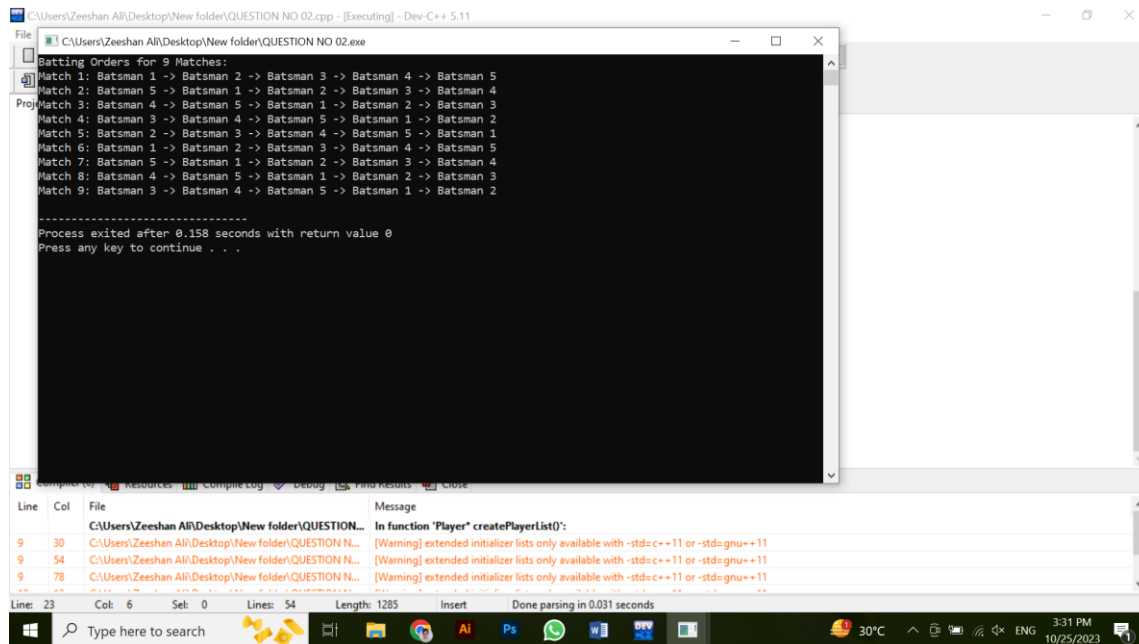
The screenshot displays the Dev-C++ IDE with a C++ program for a batting order simulation. The program is titled "QUESTION NO 02.cpp" and is located at "C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02.cpp". The code is as follows:

```
1 #include <iostream>
2 #include <string>
3 using namespace std;
4 struct Player {
5     string name;
6     Player* next;
7 };
8 Player* createPlayerList() {
9     Player* team = new Player("Batsman 1", new Player("Batsman 2", new Player("Batsman 3",
10     new Player("Batsman 4", new Player("Batsman 5", NULL))));
11     return team;
12 }
13 void rotateBatsmenClockwise(Player** head) {
14     if (*head == NULL || (*head)->next == NULL) {
15         return;
16     }
17     Player* current = *head;
18     Player* lastBatsman = NULL;
19     while (current->next != NULL) {
20         lastBatsman = current;
21         current = current->next;
22     }
23     current->next = *head;
24     *head = current;
25     lastBatsman->next = NULL;
26 }
27
28 void printBattingOrder(Player* head) {
29     Player* current = head;
30     while (current != NULL) {
31         cout << current->name;
32         current = current->next;
33         if (current != NULL) {
34             cout << " -> ";
35         }
36     }
37     cout << endl;
38 }
39
40 int main() {
41     Player* team = createPlayerList();
42     cout << "Batting Orders for 9 Matches:" << endl;
43     for (int match = 1; match <= 9; match++) {
44         cout << "Match " << match << " : ";
45         printBattingOrder(team);
46         rotateBatsmenClockwise(&team);
47     }
48     return 0;
49 }
```

The IDE shows the following output in the console:

```
Batting Orders for 9 Matches:
Match 1 : Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 2 : Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 3 : Batsman 3 -> Batsman 4 -> Batsman 5
Match 4 : Batsman 4 -> Batsman 5
Match 5 : Batsman 5
Match 6 : Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 7 : Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 8 : Batsman 3 -> Batsman 4 -> Batsman 5
Match 9 : Batsman 4 -> Batsman 5
```

## Output:



The screenshot shows the output of a C++ program in a Dev-C++ window. The program is titled "QUESTION NO 02.exe" and is located at "C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02.exe". The output displays a list of 9 matches, each showing a sequence of batsman numbers. For example, Match 1: Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5. The output also shows the process exiting after 0.158 seconds with a return value of 0. The Dev-C++ interface includes a menu bar, a toolbar, a project explorer, a compiler output window, and a status bar.

```
File Edit Search View Project Execute Tools AStyle Window Help
C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION NO 02.exe
Batting Orders for 9 Matches:
Match 1: Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 2: Batsman 5 -> Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4
Match 3: Batsman 4 -> Batsman 5 -> Batsman 1 -> Batsman 2 -> Batsman 3
Match 4: Batsman 3 -> Batsman 4 -> Batsman 5 -> Batsman 1 -> Batsman 2
Match 5: Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5 -> Batsman 1
Match 6: Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4 -> Batsman 5
Match 7: Batsman 5 -> Batsman 1 -> Batsman 2 -> Batsman 3 -> Batsman 4
Match 8: Batsman 4 -> Batsman 5 -> Batsman 1 -> Batsman 2 -> Batsman 3
Match 9: Batsman 3 -> Batsman 4 -> Batsman 5 -> Batsman 1 -> Batsman 2

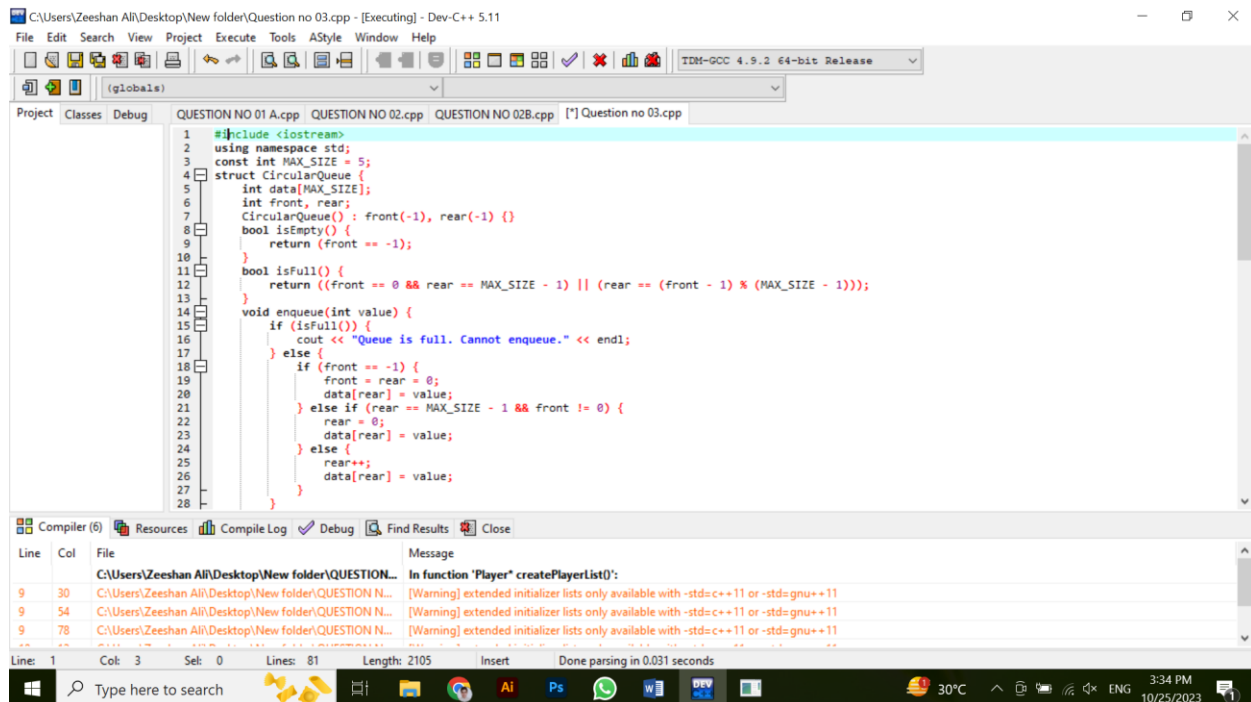
Process exited after 0.158 seconds with return value 0
Press any key to continue . . .

Line Col File Message
9 30 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION... In function 'Player* createPlayerList()':
9 54 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N... [Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
9 78 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N... [Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 23 Col: 6 Sel: 0 Lines: 54 Length: 1285 Insert Done parsing in 0.031 seconds
```

## Question no 04:

## Code:



The screenshot shows the code of a C++ program in a Dev-C++ window. The program is titled "QUESTION no 03.cpp" and is located at "C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.cpp". The code defines a circular queue structure and implements its operations. The Dev-C++ interface includes a menu bar, a toolbar, a project explorer, a compiler output window, and a status bar.

```
File Edit Search View Project Execute Tools AStyle Window Help
C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.cpp - [Executing] - Dev-C++ 5.11
QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp [*] Question no 03.cpp
1 #include <iostream>
2 using namespace std;
3 const int MAX_SIZE = 5;
4 struct CircularQueue {
5     int data[MAX_SIZE];
6     int front, rear;
7     CircularQueue() : front(-1), rear(-1) {}
8     bool isEmpty() {
9         return (front == -1);
10    }
11    bool isFull() {
12        return ((front == 0 && rear == MAX_SIZE - 1) || (rear == (front - 1) % (MAX_SIZE - 1)));
13    }
14    void enqueue(int value) {
15        if (isFull()) {
16            cout << "Queue is full. Cannot enqueue." << endl;
17        } else {
18            if (front == -1) {
19                front = rear = 0;
20                data[rear] = value;
21            } else if (rear == MAX_SIZE - 1 && front != 0) {
22                rear = 0;
23                data[rear] = value;
24            } else {
25                rear++;
26                data[rear] = value;
27            }
28        }
29    }
30    }
31    }

Line Col File Message
9 30 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION... In function 'Player* createPlayerList()':
9 54 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N... [Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
9 78 C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N... [Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 1 Col: 3 Sel: 0 Lines: 81 Length: 2105 Insert Done parsing in 0.031 seconds
```

C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Classes Debug QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp [\*] Question no 03.cpp

```
28 }
29
30 int dequeue() {
31     int value = -1;
32     if (isEmpty()) {
33         cout << "Queue is empty. Cannot dequeue." << endl;
34     } else {
35         value = data[front];
36         if (front == rear) {
37             front = rear = -1;
38         } else {
39             if (front == MAX_SIZE - 1) {
40                 front = 0;
41             } else {
42                 front++;
43             }
44         }
45     }
46     return value;
47 }
48 int peek() {
49     if (isEmpty()) {
50         return data[front];
51     } else {
52         cout << "Queue is empty. Cannot peek." << endl;
53         return -1;
54     }
55 }
```

Compiler (6) Resources Compile Log Debug Find Results Close

Line	Col	File	Message
9	30	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	In function 'Player* createPlayerList()':
9	54	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
9	78	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 1 Col: 3 Sel: 0 Lines: 81 Length: 2105 Insert Done parsing in 0.031 seconds

Type here to search

30°C 3:34 PM 10/25/2023

C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.cpp - [Executing] - Dev-C++ 5.11

File Edit Search View Project Execute Tools AStyle Window Help

(globals)

Project Classes Debug QUESTION NO 01 A.cpp QUESTION NO 02.cpp QUESTION NO 02B.cpp [\*] Question no 03.cpp

```
55 }
56
57 void QueueFunc(CircularQueue& Q1, CircularQueue& Q2) {
58     while (!Q1.isEmpty()) {
59         int value = Q1.dequeue();
60         Q2.enqueue(value);
61     }
62     while (!Q2.isEmpty() && Q2.peek() != 38) {
63         int value = Q2.dequeue();
64         Q2.enqueue(value);
65     }
66 }
67 int main() {
68     CircularQueue Q1, Q2;
69     Q1.enqueue(58);
70     Q1.enqueue(94);
71     Q1.enqueue(7);
72     Q1.enqueue(11);
73     Q1.enqueue(38);
74     QueueFunc(Q1, Q2);
75     while (!Q2.isEmpty()) {
76         cout << Q2.dequeue() << " ";
77     }
78     cout << endl;
79     return 0;
80 }
81 }
```

Compiler (6) Resources Compile Log Debug Find Results Close

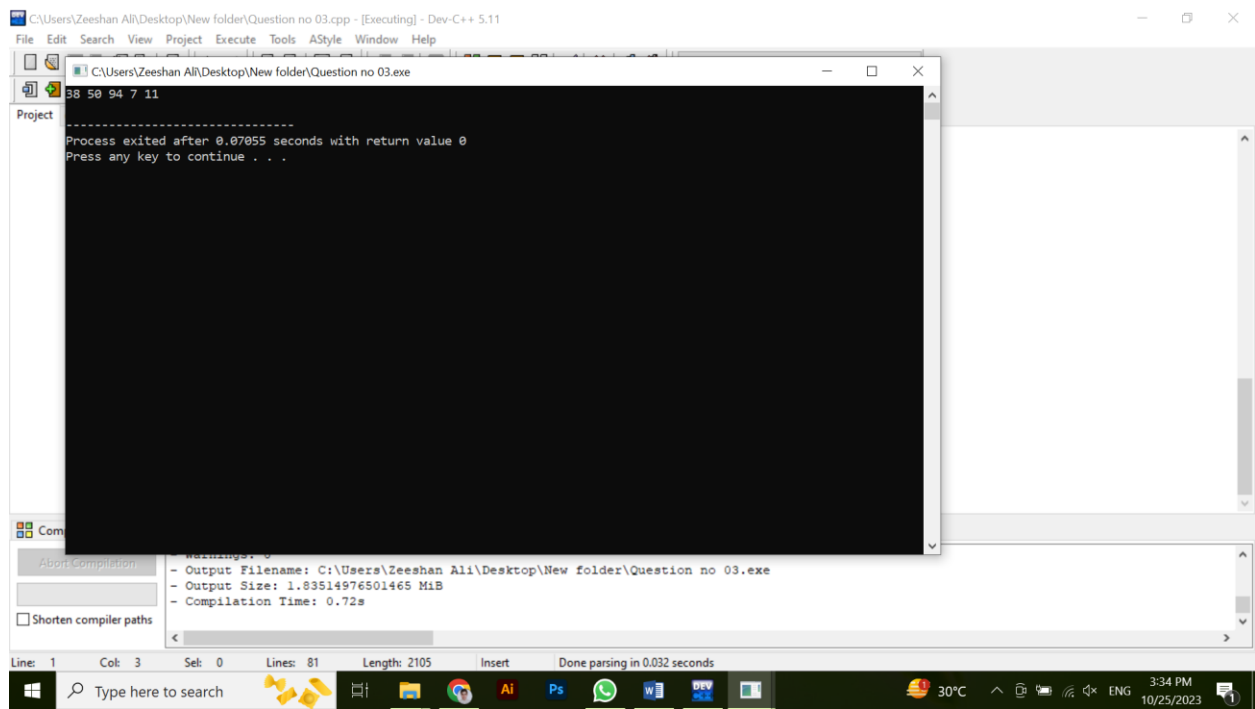
Line	Col	File	Message
9	30	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	In function 'Player* createPlayerList()':
9	54	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11
9	78	C:\Users\Zeeshan Ali\Desktop\New folder\QUESTION N...	[Warning] extended initializer lists only available with -std=c++11 or -std=gnu++11

Line: 1 Col: 3 Sel: 0 Lines: 81 Length: 2105 Insert Done parsing in 0.031 seconds

Type here to search

30°C 3:34 PM 10/25/2023

## Output:



The screenshot shows the Dev-C++ IDE interface. The main window displays the source code of a C++ program. The console window, titled "C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.exe", shows the output of the program: "38 50 94 7 11". Below the output, a message states: "Process exited after 0.07055 seconds with return value 0. Press any key to continue . . .". The compiler window, titled "Compiler", shows the output of the compilation process: "Output Filename: C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.exe", "Output Size: 1.03514976501465 MiB", and "Compilation Time: 0.72s". The status bar at the bottom indicates the current line and column: "Line: 1 Col: 3 Sel: 0 Lines: 81 Length: 2105 Insert Done parsing in 0.032 seconds". The Windows taskbar at the bottom shows the system clock as 3:34 PM on 10/25/2023, along with various system icons and the temperature as 30°C.

```
C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.cpp - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help

Project
C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.exe
38 50 94 7 11
-----
Process exited after 0.07055 seconds with return value 0
Press any key to continue . . .

Compiler
About Compilation
Shorten compiler paths
- Output Filename: C:\Users\Zeeshan Ali\Desktop\New folder\Question no 03.exe
- Output Size: 1.03514976501465 MiB
- Compilation Time: 0.72s

Line: 1 Col: 3 Sel: 0 Lines: 81 Length: 2105 Insert Done parsing in 0.032 seconds
Type here to search 30°C 3:34 PM 10/25/2023
```