**General Instructions:**

* **Follow the instructions given in each section.**
* **Make sure that you attempt the questions in order.**

**SECTION-A (10\*1 mark=10 marks)**

***(All questions are compulsory)***

Q1 What function is used to open a file in C?

a) read()

b) write()

c) fopen()

d) fclose()

Answer: c) fopen()

Q2 What mode should be used to open a file for writing in C?

a) "r"

b) "w"

c) "a"

d) "b"

Answer: b) "w"

Q3 What is the purpose of the fseek() function in C file handling?

a) to read a specific line in a file

b) to write to a specific location in a file

c) to move the file pointer to a specific location in a file

d) to close a file

Answer: c) to move the file pointer to a specific location in a file

Q4 Which keyword is used to declare a union in C?

a. union

b. struct

c. typedef

d. None of the above

Answer: a

Q5 What is the size of a union in C?

a. The size of the largest data type in the union

b. The sum of the sizes of all the data types in the union

c. The size of the smallest data type in the union

d. None of the above

Answer: a

Q6 What is the purpose of an enumeration in C?

a. To define a set of related constants with names

b. To define a new data type that can hold multiple values

c. To define a new data structure

d. None of the above

Answer: a

Q7 Which keyword is used to define a struct in C?

A) typedef

B) define

C) struct

D) union

Answer: C) struct

Q8 What is the default access specifier for members of a struct in C?

A) public

B) private

C) protected

D) There is no default access specifier

Answer: A) public

Q9 Which of the following is the general format of a recursive function?

a) return\_type function\_name(arguments){

function\_name(arguments);

}

b) return\_type function\_name(arguments){

if(base\_case)

return some\_value;

function\_name(arguments);

}

c) return\_type function\_name(arguments){

if(base\_case)

return some\_value;

return function\_name(arguments);

}

d) None of the above

Answer: c) return\_type function\_name(arguments){

if(base\_case)

return some\_value;

return function\_name(arguments);

}

Q10 What is tail recursion?

a) When the recursive call is the last statement in the function

b) When the recursive call is the first statement in the function

c) When the recursive call is in the middle of the function

d) None of the above

Answer: a) When the recursive call is the last statement in the function

**SECTION-B (5\*2 mark=10 marks)**

***(All questions are compulsory)***

Q11 What is the output of the following recursive function when called with an argument of 2?

void printPattern(int n) {

if (n == 0) {

return;

}

printf("%d ", n);

printPattern(n-1);

printf("%d ", n);

}

A. 1 2 2 1

B. 2 1 1 2

C. 2 1 2 1

D. 1 2 1 2

Q12 What is the output of the following code?

#include <stdio.h>

struct point {

int x;

int y;

};

int main() {

struct point p1 = { 5, 10 };

struct point p2 = p1;

printf("(%d,%d) (%d,%d)\n", p1.x, p1.y, p2.x, p2.y);

p2.x = 15;

printf("(%d,%d) (%d,%d)\n", p1.x, p1.y, p2.x, p2.y);

return 0;

}

A. (5,10) (5,10) (5,10) (15,10)

B. (5,10) (5,10) (15,10) (15,10)

C. (5,10) (15,10) (5,10) (15,10)

D. (15,10) (5,10) (15,10) (5,10)

Correct answer: A

Q13 Which of the following is an advantage of using typedef with a structure?

a. It makes the code easier to read and understand

b. It reduces the size of the structure

c. It adds a new member to the structure

d. It makes the structure immutable

Correct answer: a

Q14 What is the output of the following code snippet?

#include <stdio.h>

enum days { SUN, MON, TUE, WED=7, THU, FRI, SAT };

int main() {

enum days d = TUE;

printf("%d", THU);

return 0;

}

a) 2

b) 7

c) 8

d) 9

Answer: b

Q15 What is the output of the following program?

#include <stdio.h>

union data {

int i;

char c;

};

int main() {

union data d;

d.i = 65;

printf("d.i = %d ", d.i);

printf("d.c = %c ", d.c);

d.c = 'A';

printf("d.i = %d ", d.i);

printf("d.c = %c ", d.c);

return 0;

}

a) d.i = 65 d.c = A d.i = 65 d.c = A

b) d.i = 65, d.c = A, d.i = garbage value, d.c = garbage value

c) Compiler error

d) None of the above

Correct answer: a

**SECTION-C(Coding Question) (2x5 marks=5 marks)**

Q16. Suppose you are working on a project that requires generating all binary sequences of a certain length. Specifically, you need to find the count of binary sequences of length 2n such that the sum of the first n bits is the same as the sum of the last n bits..

**Input:**

one integer n.

**Constraints:**

0<n<=10

**Output:**

**Number of binary sequences of length 2n satisfying the condition given in the problem.**

**an Integer**

Sample test Cases

|  |  |  |
| --- | --- | --- |
|  | Input | Output |
| STC1 | 2  Explanation: all binary sequences of a certain length. Specifically, you need to find the count of binary sequences of length 2n such that the sum of the first n bits is the same as the sum of the last n bits are 0101 1111 1001 0110 0000 1010.  hence answer 6 |  |
| STC2 | 1  Explanation: all binary sequences of a certain length. Specifically, you need to find the count of binary sequences of length 2n such that the sum of the first n bits is the same as the sum of the last n bits is 11 00.  hence answer is 2. | 2 |

**Solution 16:**

#include <stdio.h>

int ans;

int abs(int d)

{

if(d < 0)

{

return -d;

}

return d;

}

int d;

void findAllSequences(int diff, char\* out, int start, int end)

{

if (abs(diff) > (end - start + 1) / 2)

return;

if (start > end)

{

if(diff == 0)

{

ans++;

}

return;

}

out[start] = '0', out[end] = '1';

findAllSequences(diff + 1, out, start + 1, end - 1);

out[start] = out[end] = '1';

findAllSequences(diff, out, start + 1, end - 1);

out[start] = out[end] = '0';

findAllSequences(diff, out, start + 1, end - 1);

out[start] = '1', out[end] = '0';

findAllSequences(diff - 1, out, start + 1, end - 1);

}

int main()

{

int n;

ans =0;

scanf("%d",&n);

char out[2 \* n + 1];

out[2 \* n] = '\0';

findAllSequences(0, out, 0, 2\*n - 1);

printf(“%d”,ans);

return 0;

}

Test Cases

|  |  |  |
| --- | --- | --- |
|  | Input | Output |
| TC1 | 3 | 20 |
| TC2 | 4 | 70 |
| TC3 | 5 | 252 |
| TC4 | 0 | 0 |
| TC5 | 6 | 924 |

Q17. The atoi() function takes a string (which represents an integer) as an argument and returns its value. You have to build an atoi function recursively which will return an integer value x. you have to print (3\*x + 5)%101 .

**Input:**

one string

**Constraints:**

0 < length < 7

**Output:**

**an Integer**

Sample test Cases

|  |  |  |
| --- | --- | --- |
|  | Input | Output |
| STC1 | 1234  Explanation: x = 1234  (1234\*3 + 5)%101 = 71; | 71 |
| STC2 | 00101  Explanation: x = 101  (101\*3 + 5)%101 = 5; | 5 |

**Solution 17:**

**#include <stdio.h>**

**#include <string.h>**

**int myAtoiRecursive(char\* str, int n)**

**{**

**int count = 0, check;**

**for (int i = 0; i <= strlen(str); ++i)**

**{**

**check = ( ( 'a' <= str[i] && str[i] <= 'z' ) ||**

**( 'A' <= str[i] && str[i] <= 'Z' ) )?1:0;**

**if (check)**

**{**

**++count;**

**}**

**}**

**if (count != 0) {**

**return 0;**

**}**

**if (n == 1)**

**return \*str - '0';**

**return (10 \* myAtoiRecursive(str, n - 1) + str[n - 1]**

**- '0');**

**}**

**// Driver Program**

**int main(void)**

**{**

**char str[10];**

**gets(str);**

**int n = strlen(str);**

**int x = myAtoiRecursive(str, n);**

**int ans = (3\*x + 5)%101;**

**printf("%d", ans);**

**return 0;**

**}**

Test Cases

|  |  |  |
| --- | --- | --- |
|  | Input | Output |
| TC1 | 01001 | 79 |
| TC2 | 9999999 | 73 |
| TC3 | 0 | 5 |
| TC4 | 00007687 | 38 |
| TC5 | 132434 | 74 |

**SECTION-D (Coding Question)(1x10 mark=10 mark)**

**Q18 Write C program to accept batting information of cricket team using structure.It contains player name and runs scored by player,calculate total runs scored by cricket team**

**Sample Input:37,98,56,77,35,58,5,4,30,1,0**

**Sample Output: Total runs scored by the cricket team: 401**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test Case 1** | **Test Case 2** | **Test Case 3** |
| **Input** | **{"Rohit Sharma", 37},**  **{"Shikhar Dhawan", 98},**  **{"Virat Kohli", 56},**  **{"Rishabh Pant", 77},**  **{"Hardik Pandya", 35},**  **{"Krunal Pandya", 58},**  **{"Washington Sundar", 5},**  **{"Bhuvneshwar Kumar", 4},**  **{"Shardul Thakur", 30},**  **{"Yuzvendra Chahal", 1},**  **{"Prasidh Krishna", 0}** | **{"Rohit Sharma", 88},**  **{"Shikhar Dhawan", 198},**  **{"Virat Kohli", 56},**  **{"Rishabh Pant", 0},**  **{"Hardik Pandya", 0},**  **{"Krunal Pandya", 0},**  **{"Washington Sundar", 5},**  **{"Bhuvneshwar Kumar", 0},**  **{"Shardul Thakur", 00},**  **{"Yuzvendra Chahal", 0},**  **{"Prasidh Krishna", 0}** | **{"Rohit Sharma", 137},**  **{"Shikhar Dhawan", 8},**  **{"Virat Kohli", 99},**  **{"Rishabh Pant", 7},**  **{"Hardik Pandya", 56},**  **{"Krunal Pandya", 58},**  **{"Washington Sundar", 0},**  **{"Bhuvneshwar Kumar", 0},**  **{"Shardul Thakur", 0},**  **{"Yuzvendra Chahal", 0},**  **{"Prasidh Krishna", 0}** |
| **Output** | **Total runs scored by the cricket team: 401** | **Total runs scored by the cricket team:347** | **Total runs scored by the cricket team:365** |

**Solution:**

**#include <stdio.h>**

**struct player\_score {**

**char name[50];**

**int runs\_scored;**

**};**

**int total\_runs\_scored(struct player\_score \*team, int num\_players);**

**int main() {**

**// Define a structure array to store batting information of cricket team**

**struct player\_score team[] = {**

**{"Rohit Sharma", 37},**

**{"Shikhar Dhawan", 98},**

**{"Virat Kohli", 56},**

**{"Rishabh Pant", 77},**

**{"Hardik Pandya", 35},**

**{"Krunal Pandya", 58},**

**{"Washington Sundar", 5},**

**{"Bhuvneshwar Kumar", 4},**

**{"Shardul Thakur", 30},**

**{"Yuzvendra Chahal", 1},**

**{"Prasidh Krishna", 0}**

**};**

**// Calculate the total runs scored by the team using the function**

**int total\_runs = total\_runs\_scored(team, sizeof(team) / sizeof(team[0]));**

**// Print the total runs scored by the team**

**printf("Total runs scored by the cricket team: %d\n", total\_runs);**

**return 0;**

**}**

**// Function to calculate the total runs scored by the team using a structure pointer**

**int total\_runs\_scored(struct player\_score \*team, int num\_players) {**

**int total\_runs = 0;**

**for (int i = 0; i < num\_players; i++) {**

**total\_runs += team[i].runs\_scored;**

**}**

**return total\_runs;**

**}**