



PPS CT2 - Prev year QP Set-7

Programming For Problem Solving (SRM Institute of Science and Technology)



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Answer Key

Test: CLAT- 2

Course Code & Title: 21CSS101J / Programming for Problem Solving

Year & Sem: I / I

Date:

Duration: 1 hr 40 mts

Max. Marks: 50

Course Learning Rationale (CLR):

CLR-2 : Utilize the appropriate operators and control statements to solve engineering problems

CLR-3 : Store and retrieve data in a single and multidimensional array

CLR-4 : Create custom designed functions to perform repetitive tasks in any application

Course Learning Outcomes (CLO):

CLO-2 : To use appropriate data types in simple data processing applications. To create programs using the concept of arrays.

CLO-3 : To create string processing applications with single and multi-dimensional arrays.

CLO-4 : To create user-defined functions with required operations. To implement pointers in applications with dynamic memory.

NOTE:

- For each 5 mark question, 2 marks logic (as seen in program irrespective of syntax errors) and 3 marks for program.
- Based on number of syntax errors in program, program marks (3) may be allotted.
- There is no need to write `#include<stdio.h>` for all programs
- There are many ways of writing the same program!

Part – A (1 x 25 = 25 Marks) Instructions: This section has only ONE question with internal choice.						
Q. No	Question	Marks	BL	CO	PO	PI Code
1a	(i) Problem: Network Admin wants to know how many student users are there in the college, get the total users, staff users details from the client. Note for every 3 staff user there is one non-teaching staff user assigned by default. Sample Input: <ul style="list-style-type: none"> • Total Users: 856 • Staff Users: 126 Sample Output: <ul style="list-style-type: none"> • Student Users: 688 Solution: <code>#include <stdio.h></code> <code>int main()</code> <code>{</code> <code> int stuu, su, tu, ntu;</code> <code> printf("Total users: ");</code> <code> scanf("%d",&tu);</code> <code> printf("Staff Users: ");</code> <code> scanf("%d",&su);</code>	5	2	2	PO2	2.5.2

<pre> ntu=su/3; stuu=tu-(su+ntu); printf("Student Users = %d",stuu); return 0; } (ii) Problem: Jeni needs to design a program to calculate all arithmetic operations by using a switch case concept, kindly help jeni to design a code Sample Input: <ul style="list-style-type: none"> Enter two numbers: 5 6 Enter your choice: 1. Add 2. Sub 3. Mul 4. Div 5. Mod 3 Output Format: <ul style="list-style-type: none"> Multiplication Result is 30 Solution: #include<stdio.h> int main() { int a, b, choice; printf("Enter your choice\n"); printf("1. Addition\n2. Subtraction\n3. Multiplication\n4. Division\n"); scanf("%d", &choice); if(choice > 4) { printf("Select with in the range!\n"); } else { printf("Enter 2 integer numbers\n"); scanf("%d %d", &a, &b); } switch(choice) { case 1: printf("%d + %d = %d\n", a, b, (a+b)); break; case 2: printf("%d - %d = %d\n", a, b, (a-b)); break; case 3: printf("%d x %d = %d\n", a, b, (a*b)); break; case 4: if(b != 0) printf("%d / %d = %d\n", a, b, (a/b)); else printf("Number can't be divided by 0\n"); break; default: printf("You entered wrong choice\n"); break; } return 0; } </pre>	5	1	2	PO1	1.7.1
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	<p>(iii) Problem: Professor needs to calculate the total and aggregate of a student and he wants to display the grade obtained by the student. If the student scores an aggregate greater than 75%, then the grade is Distinction. If aggregate is $60 \geq$ and < 75, then the grade is First Division. If aggregate is $50 \geq$ and < 60, then the grade is Second Division. If aggregate is $40 \geq$ and < 50, then the grade is Third Division. Else the grade is Fail.</p> <p>Sample Input: Enter Marks for each subject</p> <p>Sample Output: Display the total, aggregate and grade</p> <p>Solution: #include <stdio.h></p> <pre>int main() { float m1,m2,m3,total,avg; printf("Enter Marks for 3 subjects"); scanf("%f%f%f",&m1,&m2,&m3); total=m1+m2+m3; avg=total/3; if(avg>=75) printf("Distinction"); else if(avg>=60) printf("First"); else if(avg>=50) printf("Second"); else if(avg>=40) printf("Third"); else printf("Fail"); }</pre> <p>(iv) Problem: Seetha likes to play with the arrays and she becomes more familiar in using arrays and Now she posted a test to her friend Geetha by giving a List of 10 positive numbers as an array and she asked geetha to add all even numbers in the list and display the result.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter the numbers: 10 11 12 13 14 15 16 17 18 20. <p>Sample Output:</p> <ul style="list-style-type: none"> Sum of even numbers is: 90 <p>Solution: #include<stdio.h></p> <pre>int main() { int a[10],sum=0,i; printf("Enter 10 numbers"); for(i=0;i<10;i++) { scanf("%d",&a[i]); if(a[i]%2==0) sum+=a[i]; } printf("Sum of all even numbers = %d",sum); }</pre>	5	1	2	PO2	2.5.2
	<p>(iv) Problem: Seetha likes to play with the arrays and she becomes more familiar in using arrays and Now she posted a test to her friend Geetha by giving a List of 10 positive numbers as an array and she asked geetha to add all even numbers in the list and display the result.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter the numbers: 10 11 12 13 14 15 16 17 18 20. <p>Sample Output:</p> <ul style="list-style-type: none"> Sum of even numbers is: 90 <p>Solution: #include<stdio.h></p> <pre>int main() { int a[10],sum=0,i; printf("Enter 10 numbers"); for(i=0;i<10;i++) { scanf("%d",&a[i]); if(a[i]%2==0) sum+=a[i]; } printf("Sum of all even numbers = %d",sum); }</pre>	5	2	2	PO1	1.7.1

1b	<p>}</p> <p>(v) Problem: Alice has N subject marks with him. He needs to find the maximum difference between the marks scored. Help him to solve the problem with arrays.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> N Marks <p>Sample Output:</p> <ul style="list-style-type: none"> Display the maximum difference <p>Solution: #include<stdio.h></p> <pre>int main() { int a[10],sum=0,i,j,t,n; printf("Enter n Subjects"); scanf("%d",&n); printf("Enter n Subjects marks"); for(i=0;i<n;i++) { scanf("%d",&a[i]); } for (i=0; i<n-1; i++){ for (j=i+1; j<n; j++){ if (a[i] > a[j]) { t=a[i]; a[i] = a[j]; a[j] = t; } } } printf("the Maximum Diff is %d", a[n-1]-a[0]); }</pre> <p>Alternatively, you can find maximum and minimum and subtract the difference</p> <p style="text-align: center;">(OR)</p> <p>(i) Problem: Jeni, pavi and diana are close friends, jeni's age is 19, pavi's age is 17, and diana's age is 16, find who is elder among those by writing a C program using conditional statement.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter three friend age: 19 17 16 <p>Sample Output:</p> <ul style="list-style-type: none"> The eldest among three is: 19 <p>Solution: # include <stdio.h></p> <pre>void main() { int a, b, c, big; printf("Enter three friends age : "); scanf("%d %d %d", &a, &b, &c);</pre>	5	2	2	PO2	2.5.2
		5	1	2	PO1	1.7.1

<pre>big = a > b ? (a > c ? a : c) : (b > c ? b : c); printf("\nThe eldest among three is : %d", big); }</pre> <p>(ii) Problem: Raja is class representative for section A which consists of 10 students including him, help raja to sort all the register numbers and display it in an ascending order.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter ten register numbers :77 88 66 99 55 44 22 33 11 102 <p>Sample Output:</p> <ul style="list-style-type: none"> The Sorted list is : 11 22 33 44 55 66 77 88 99 102 <p>Solution: #include<stdio.h></p> <pre>int main() { int a[10],sum=0,i,j,t,n; printf("Enter number of students"); scanf("%d",&n); printf("Enter n Register numbers"); for(i=0;i<n;i++) { scanf("%d",&a[i]); } for (i=0; i<n-1; i++){ for (j=i+1; j<n; j++){ if (a[i] > a[j]) { t=a[i]; a[i] = a[j]; a[j] = t; } } } printf("The Sorted Liost is \n") for(i=0;i<n;i++) { printf("%d\n",a[i]); } }</pre>	5	2	2	PO2	2.5.2
<p>(iii) Problem: A Shopkeeper wants to know how many chocolates he is having in his shop, he is having 100 chocolate in box1, 150 in box2, 200 in box3, 250 in box4 and 300 in box5 can you help him to find the total number chocolates ?</p> <p>Hint: Use one dimensional array to accept number of chocolates,</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter number of chocolates in Each box: 100 150 200 250 300 <p>Sample Output:</p> <ul style="list-style-type: none"> Total number of chocolates : 1000 <p>Solution: #include<stdio.h></p> <pre>int main()</pre>	5	1	2	PO1	1.7.1

	<pre> { int a[10],sum=0,i,n; printf("Enter number of Chocolates in each box"); for(i=0;i<4;i++) { scanf("%d",&a[i]); sum+=a[i]; } printf("The Total number of chocolates is %d \n",sum); } </pre> <p>(iv) Problem: Auditor Needs to calculate tax for an individual, For calculating tax you need to apply the following conditions, a.If income is less than or equal to 1,50,000 then no tax b.If taxable income is 1,50,001 – 3,00,000 the charge 10% tax c.If taxable income is 3,00,001 – 5,00,000 the charge 20% tax d.If taxable income is above 5,00,001 then charge 30% tax</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter the income:200000. <p>Sample Output:</p> <ul style="list-style-type: none"> Income Tax= 20000 <p>Solution:</p> <pre> int main() { float in; printf("Enter the income"); scanf("%f",&in); if(in<=150000) printf("No Tax"); else if(in>= 150001 && in<=300000) printf("Tax=%f",in*.1); else if(in>= 300001 && in<=500000) printf("Tax=%f",in*.2); else if(in>= 500001) printf("Tax=%f",in*.3); else printf("Enter correct value"); } </pre> <p>(v) Problem: Malini with his family going for a Magic show. The seating arrangement is triangular in size. Show staffs insisted the audience to sit in odd row if the seat number is odd and in even row if the seat number is even. But the instruction is very confusing for Malini and family. So help them with the seating layout so that they can sit in correct seats.</p> <p>Input Format: Single value representing the number of rows in the theatre.</p> <p>Output Format: Print the layout based on the number of rows.</p> <pre> 6 1 2 4 1 3 5 2 4 6 8 1 3 5 7 9 2 4 6 8 10 12 </pre>	5	2	2	PO2	2.5.2
	<p>(v) Problem: Malini with his family going for a Magic show. The seating arrangement is triangular in size. Show staffs insisted the audience to sit in odd row if the seat number is odd and in even row if the seat number is even. But the instruction is very confusing for Malini and family. So help them with the seating layout so that they can sit in correct seats.</p> <p>Input Format: Single value representing the number of rows in the theatre.</p> <p>Output Format: Print the layout based on the number of rows.</p> <pre> 6 1 2 4 1 3 5 2 4 6 8 1 3 5 7 9 2 4 6 8 10 12 </pre>	5	3	2	PO2	2.5.2

	Solution : <pre> #include<stdio.h> int main() { int i,j,k,n; printf("Enter how many rows you want : "); scanf("%d", &n); for(i=1; i<=n; i++) { if(i%2 == 0) k=2; else k=1; for(j=1; j<=i; j++) { printf(" %d", k); k+=2; } printf("\n"); } return 0; } </pre>					
<p style="text-align: center;">Part – B (1 x 25 = 25 Marks)</p> <p>Instructions: This section has only ONE question with internal choice.</p>						
2a	i) Problem <p>The citizens of Byteland regularly play a game. They have blocks each denoting some integer from 0 to 9. These are arranged together in a random manner without seeing to form different numbers keeping in mind that the first block is never a 0. Once they form a number they read in the reverse order to check if the number and its reverse is the same. If both are same then the player wins. We call such numbers <i>palindrome</i>. Ash happens to see this game and wants to simulate the same in the computer. As the first step he wants to take an input from the user and check if the number is a palindrome and declare if the user wins or not.</p> <p>Input Get N integers</p> <p>Output For each input output "wins" if the number is a palindrome and "loses" if not, in a new line.</p> <p>Solution: <pre> #include <stdio.h> int main(void) { int t,n,i,r,rev; scanf("%d",&t); for(i=1;i<=t;i++) { scanf("%d",&n); int n1=n; rev=0; while(n!=0) { r=n%10; rev=rev*10+r; n=n/10; } if(rev==n1){ printf("wins\n"); } } } </pre> </p>	5	3	3	PO2	2.5.2

	<pre> } else{ printf("loses\n"); } } return 0; } </pre> <p>(ii) Problem: Santosh needs to know the length of his first name and Last name so just help Santosh to find the length of his name by getting his first name and last name separately and display the length of first name and last name separately.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter first name: Santosh Enter Last name: Raj <p>Sample Output:</p> <ul style="list-style-type: none"> Length of the first name is: 7 Length of the Last name is: 3 <p>Solution: <pre> #include<stdio.h> #include<string.h> int main() { char str[1000], str1[1000]; int i; printf("Enter the first name: "); scanf("%s", str); printf("Enter the Last name: "); scanf("%s", str1); printf("Length of the first name is %ld", strlen(str)); printf("Length of the Last name is %ld", strlen(str1)); return 0; } </pre> </p>	5	1	3	PO1	1.7.1
	<p>iii) Problem: Ramu is learning the new concept string in C programming, he wants to do some examples programs related to strings, so he decided to design a code which finds the vowels in the given string please help ramu to design a code.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter a string: srm institute of science and technology <p>Sample Output:</p> <ul style="list-style-type: none"> Number of vowels in the string are : 12 <p>Solution: <pre> #include <stdio.h> int main() { int c = 0, count = 0; char s[1000]; printf("Input a string\n"); gets(s); while (s[c] != '\0') { if (s[c] == 'a' s[c] == 'A' s[c] == 'e' s[c] == 'E' s[c] == 'i' s[c] == 'I' s[c] == 'o' s[c] == 'O' s[c] == 'u' s[c] == 'U') </pre> </p>	5	1	3	PO1	1.7.1

	<pre> count++; c++; } printf("Number of vowels in the string: %d", count); return 0; } </pre> <p>(iv) Problem: Amir has an interest in handling strings he wants to know how many time the character 'a' is present in his friend name Ramakrishnan, so help amir to find the same.</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter Name: Ramakrishnan <p>Sample Output:</p> <ul style="list-style-type: none"> Character 'a' present: 3 times <p>Solution: #include <stdio.h> int main() { int c = 0, count = 0; char s[1000]; printf("Input a string\n"); gets(s); while (s[c] != '\0') { if (s[c] == 'a') count++; c++; } printf("Number of 'a' in the string: %d", count); return 0; }</p>	5	2	3	PO2	2.5.2
	<p>v) Problem: Alice needs to implement the strings concept she want to count the number of articles ('a', 'an and 'the') in the sentence "An apple a day keeps the doctor away", so she need to know how to use predefined string handling functions to count the number of articles, help her to calculate.</p> <p>Sample Output: Display the count of number of articles</p> <p>Solution: #include<stdio.h> #include<stdlib.h> int main() { char str[1000], str1[1000]; int count = 0;</p> <pre> gets(str); while(str[i] != '\0'){ if(strcmp(str+i,"a ") == 0 strcmp(str+i,"an ") == 0 strcmp(str+i,"the ") == 0 strcmp(str+i,"A ") == 0 strcmp(str+i,"An ") == 0 strcmp(str+i,"The ") == 0) count++; i++; } printf("%d",count); } </pre>	5	3	3	PO2	2.5.2
2b	<pre> } </pre>	5	2	4	PO1	2.5.2

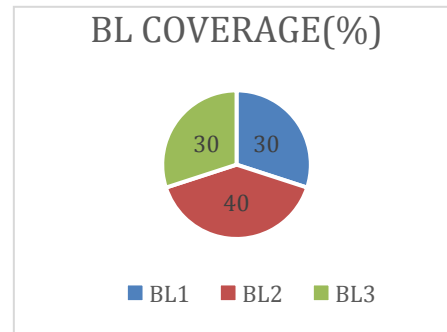
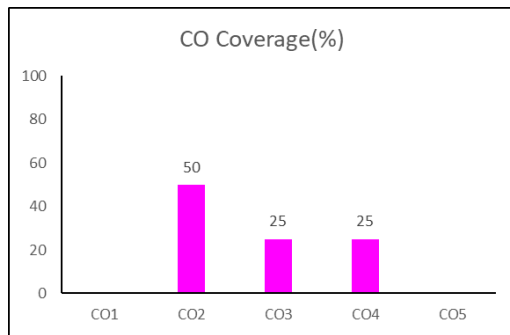
	<p style="text-align: center;">(OR)</p> <p>(i) Problem: Meena has an array of numbers like 10 20 30 40 50 60 70, and she is having a pointer variable which she used to store the address of the array variable, she needs to display the address of 10 and the address of 40 by accessing the <i>pointer</i> variable</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Enter array of numbers: 10 20 30 40 50 60 70 <p>Sample Output:</p> <ul style="list-style-type: none"> Address of 10 is: 1000 Address of 40 is: 1012 <p>Solution: #include<stdio.h> int main() { int a[10],i, *ptr; printf("Enter n Register numbers"); for(i=0;i<7;i++) { scanf("%d",&a[i]); } ptr=a; printf("%d element address is %d",a[0],ptr); printf("%d element address is %d",a[3],ptr+3); }</p> <p>(ii) Problem: Alice, Bob and Charlie are friends everyone had a task to find the binary equivalent of decimal number, Alice and bob has completed the task but Charlie needs to implement the task by using a function concept. The function should convert decimal to binary string. So please help Charlie to develop the same: Hint: Consider the number 12 12 / 2 = 6 Re 0 6 / 2 = 3 Re 0 3 / 2 = 1 Re 1 1 / 2 = 0 Re 1 stop Binary equivalent of 12 is 1100</p> <p>Sample Input:</p> <ul style="list-style-type: none"> Get input number <p>Sample Output:</p> <ul style="list-style-type: none"> Binary equivalent <p>Solution: #include <stdio.h> #include <conio.h> void main() { int num, binary_num, decimal_num = 0, base = 1, rem; printf (" Enter a binary number with the combination of 0s and 1s \n"); scanf (" %d", &num); binary_num = num; while (num > 0) { rem = num % 10; /* divide the binary number by 10 and store the remainder in rem variable. */ decimal_num = decimal_num + rem * base; num = num / 10; // divide the number with quotient base = base * 2; } printf (" The binary number is %d \t", binary_num); // print</p>	5	3	4	PO2	2.5.2
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	<p>the binary number <pre>printf("\n The decimal number is %d \t", decimal_num); // print the decimal getch(); }</pre></p> <p>(iii) Problem Raja has to travel to his native place. For this, he can avail any one of two flight services.</p> <ul style="list-style-type: none"> • The first flight service charges X rupees. • The second flight service charges Y rupees. <p>Raja wants to spend the minimum amount of money. Which flight service should Ravi take? Use pointers to implement the concept</p> <p>Sample Input:</p> <ul style="list-style-type: none"> • Get X and Y values <p>Sample Output:</p> <ul style="list-style-type: none"> • Display which flight has minimum charge <p>Solution: <pre>#include<stdio.h> int main() { int x,y; int *a, *b; printf("Enter first flight charges"); scanf("%d",&x); printf("Enter Second flight charges"); scanf("%d",&y); a=&x; b=&y; if(*a>*b) printf("The minimum flight charge is %d",*b); else printf("The minimum flight charge is %d",*a); }</pre></p> <p>(iv) Problem Kavitha is playing a game called swapping, she needs to swap the two numbers using C program she has completed that task by using functions, but the problem is when she calls the function swap the numbers get swapped but when she prints the value in main function it is not getting swapped then she comes to know that she needs to implement swapping concept by using pointers so help Kavitha to perform swapping of two numbers by using call by reference method.</p> <p>Sample Input: Enter values to swap</p> <p>Sample Output: Display values after swapping</p> <p>Solution: <pre>#include <stdio.h> void swap(int *, int *); //prototype of the function int main() { int a = 10; int b = 20; printf("Before swapping the values in main a = %d, b = %d\n",a,b); swap(&a,&b); }</pre></p>	5	2	4	PO2	2.5.2
		5	3	4	PO2	2.5.2

<pre> printf("After swapping values in main a = %d, b = %d\n",a,b); } void swap (int *a, int *b) { int temp; temp = *a; *a=*b; *b=temp; printf("After swapping values in function a = %d, b = %d\n",*a,*b); } v) Problem: Two friends who are good in mathematics and one of them challenged the other one to find the Prime Number in a given range say " A " and " B " , here A & B are the ranges. Use functions to print the prime numbers between the ranges. Input: Get ranges A and B Output: Print the prime numbers Solution: #include <stdio.h> #include<math.h> int isPrime(int x){ int flag = 1; for (int j = 2; j <= sqrt(x); ++j) { if (x % j == 0) { flag = 0; break; } } return(flag); } int main() { int a, b, i, j, flag; printf("Enter lower bound of the interval: "); scanf("%d", &a); // Take input printf("\nEnter upper bound of the interval: "); scanf("%d", &b); // Take input printf("\nPrime numbers between %d and %d are: ", a, b); for (i = a; i <= b; i++) { if (i == 1 i == 0) continue; if(isPrime(i)) printf("%d ", i); } return 0; } </pre> <p>Instead of sqrt(x), x/2 or pow(x, 0.5) are alternate choices.</p>	5	3	4	PO2	2.5.2
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***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Approved by the Audit Professor/Course Coordinator