



BHARATI VIDYAPEETH'S
INSTITUTE OF COMPUTER APPLICATIONS & MANAGEMENT (BVICAM)
(Affiliated to Guru Gobind Singh Indraprastha University, Approved by AICTE, New Delhi)

A-4, Paschim Vihar, Rohtak Road, New Delhi-110063, Visit us at: <http://www.bvicam.in/>

Course Code: MCA-153

Course Name: Programming in C Lab

Unit	Question No.	Description
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Introductory Assignment

- I
- Q 1. Read in a character from the user and display the ASCII equivalent of the given character.
- Q 2. Read in two integers from the user and swap them without using a temporary variable
- Q 3. Print the following pattern:
- i.

```
          *
         * *
        * * *
       * * * *
      * * * * *
     * * * * *
    * * * * *
   * * * * *
  * * * * *
 * * * * *
```

ii.

```
0
101
21012
3210123
432101234
54321012345
```

iii.

```
1
12
123
1234
12345
```

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iv.

ABCDEFGGFEDCBA
 ABCDEFFEDCBA
 ABCDEEDCBA
 ABCDDCBA
 ABCCBA
 ABBA
 AA

v.

55555
 45555
 34555
 23455
 12345

vi.

1 2 3 4 4 3 2 1
 1 2 3 * * 3 2 1
 1 2 * * * * 2 1
 1 * * * * * 1

vii.

1
 2 3
 4 5 6
 7 8 9 10
 11 12 13 14 15

viii.

11111
 1 1
 1 1
 1 1
 11111

ix.

Unit	Question No.	Description
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```

1
4 9 16
25 36 49 64 81
100 121 144 169 196 226 256
289 324 361 400 441 484 529 576 625

```

x.

```

1
123
12345
1234567
123456789
1234567
12345
123
1

```

- Q 4. Design a solution to accept the characters we enter through the keyboard and print * instead of it for every letter that we type.
- Q 5. Design and develop a function to remove all extra blank spaces from a user input string.
- II Q 6. Design and develop a function to find the length of a string input by the user using pointers.
- Q 7. Design and develop a function to swap the contents of two arrays input by the user using pointers.
- Q 8. Design and develop a function to toggle the nth bit of a number using bitwise operators.
- Q 9. Design and develop a function to count the trailing zeroes in a binary number.
- III Q 10. Design and develop a program to read a list of numbers from a file and write even and odd numbers to separate files.
- Q 11. Design and develop a program to compare the contents of two files.
- IV Q 12. Design and develop a function to list all files and sub-directories

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recursively.

Practice Questions (Lab)

- I
- Q 1. An employee's basic salary is input through the keyboard. Their dearness allowance is 40% of basic salary, and house rent allowance is 20% of basic salary. Design a program to calculate employee gross salary.
 - Q 2. The distance between two cities (in km.) is input through the keyboard. Design a program to convert and print this distance in meters, feet, inches and centimeters.
 - Q 3. If the marks obtained by a student in five different subjects are input through the keyboard, find out the aggregate marks and percentage marks obtained by the student. Assume that the maximum marks that can be obtained by a student in each subject is 100.
 - Q 4. Temperature of a city in Fahrenheit degrees is input through the keyboard. Design a function to convert this temperature into Centigrade degrees.
 - Q 5. The length & breadth of a rectangle and radius of a circle are input through the keyboard. Design a program to calculate the area & perimeter of the rectangle, and the area & circumference of the circle.
 - Q 6. Two numbers are input through the keyboard into two locations C and D. Design a program to interchange the contents of C and D.
 - Q 7. If a four-digit number is input through the keyboard, design a program to obtain the sum of the first and last digit of this number.
 - Q 8. If a five-digit number is input through the keyboard, design a program to reverse the number.
 - Q 9. If a five-digit number is input through the keyboard, design a program to calculate the sum of its digits. (Hint: Use the modulus operator '%')
 - Q 10. A cashier has currency notes of denominations 10, 50 and 100. If the amount to be withdrawn is input through the keyboard in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer.
 - Q 11. If the total selling price of 15 items and the total profit earned on them is input through the keyboard, design a solution to find the cost price of one item.
 - Q 12. If a five-digit number is input through the keyboard, design a program to print a new number by adding one to each of its digits. For example if the number that is input is 12391 then the output should be displayed as 23402.
 - Q 13. Any integer is input through the keyboard. Design a program to find out whether it is an odd number or even number.

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	Q 14.	Any year is input through the keyboard. Design a program to determine whether the year is a leap year or not. (Hint: Use the % (modulus) operator)
	Q 15.	According to the Gregorian calendar, it was Monday on the date 01/01/1900. If any year is input through the keyboard design a program to find out what is the day on 1st January of this year.
	Q 16.	A five-digit number is entered through the keyboard. Design code to obtain the reversed number and to determine whether the original and reversed numbers are equal or not.
	Q 17.	If the ages of Ram, Shyam and Ajay are input through the keyboard, design code to determine the youngest of the three.
	Q 18.	Develop a program to check whether a triangle is valid or not, when the three angles of the triangle are entered through the keyboard. A triangle is valid if the sum of all the three angles is equal to 180 degrees.
	Q 19.	Find the absolute value of a number entered through the keyboard.
	Q 20.	Given the length and breadth of a rectangle, develop a program to find whether the area of the rectangle is greater than its perimeter. For example, the area of the rectangle with length = 5 and breadth = 4 is greater than its perimeter.
	Q 21.	Given three points (x_1, y_1) , (x_2, y_2) and (x_3, y_3) , develop a program to check if all the three points fall on one straight line.
	Q 22.	Given a point (x, y) , design a program to find out if it lies on the x-axis, y-axis or at the origin, viz. $(0, 0)$.
	Q 23.	A certain grade of steel is graded according to the following conditions: <ul style="list-style-type: none"> (i) Hardness must be greater than 50 (ii) Carbon content must be less than 0.7 (iii) Tensile strength must be greater than 5600 <p>The grades are as follows: Grade is 10 if all three conditions are met Grade is 9 if conditions (i) and (ii) are met Grade is 8 if conditions (ii) and (iii) are met Grade is 7 if conditions (i) and (iii) are met Grade is 6 if only one condition is met Grade is 5 if none of the conditions are met</p> <p>Develop a program, which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.</p>
	Q 24.	A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Design a solution to accept the number of days the member is late to return the book and display the fine or the appropriate message.

Unit	Question No.	Description
I	Q 25.	If the three sides of a triangle are entered through the keyboard, develop a program to check whether the triangle is valid or not. The triangle is valid if the sum of two sides is greater than the largest of the three sides. Also check whether the triangle is isosceles, equilateral, scalene or right angled triangle.
	Q 26.	In a company, worker efficiency is determined on the basis of the time required for a worker to complete a particular job. If the time taken by the worker is between 2 – 3 hours, then the worker is said to be highly efficient. If the time required by the worker is between 3 – 4 hours, then the worker is ordered to improve speed. If the time taken is between 4 – 5 hours, the worker is given training to improve his speed, and if the time taken by the worker is more than 5 hours, then the worker has to leave the company. If the time taken by the worker is input through the keyboard, find the efficiency of the worker.
	Q 27.	A university has the following rules for a student to qualify for a degree with A as the main subject and B as the subsidiary subject: <ul style="list-style-type: none"> (a) He should get 55 percent or more in A and 45 percent or more in B. (b) If he gets than 55 percent in A he should get 55 percent or more in B. However, he should get at least 45 percent in A. (c) If he gets less than 45 percent in B and 65 percent or more in A he is allowed to reappear in an examination in B to qualify. (d) In all other cases he is declared to have failed. Write a program to receive marks in A and B and Output whether the student has passed, failed or is allowed to reappear in B.
	Q 28.	The policy followed by a company to process customer orders is given by the following rules: <ul style="list-style-type: none"> (a) If a customer order is less than or equal to that in stock and has credit is OK, supply has requirement. (b) If has credit is not OK do not supply. Send him intimation. (c) If has credit is Ok but the item in stock is less than has order, supply what is in stock. Intimate to him data the balance will be shipped. Develop a C program to implement the company policy.
	Q 29.	Design appropriate functions for the following:- <ul style="list-style-type: none"> a) Binary search b) Insertion sort c) Selection sort d) Bubble sort
	Q 30.	Design a program to input a number from the keyboard .Print the number in the main routine. Pass the number to a subroutine by value. Have the subroutine print the received value Have the subroutine return twice the input value. Have the main routine print the original and the result.

Unit	Question No.	Description
II	Q 31.	Develop a program that extracts part of the given string from the specified position. For example, if the sting is "Working with strings is fun", then if from position 4, 4 characters are to be extracted then the program should return string as "king". Moreover, if the position from where the string is to be extracted is given and the number of characters to be extracted is 0 then the program should extract entire string from the specified position.
	Q 32.	Develop a program that uses an array of pointers to strings str[]. Receive two strings str1 and str2 and check if str1 is embedded in any of the strings in str[]. If str1 is found, then replace it with str2. char *str[] = { "We will teach you how to...", "Move a mountain", "Level a building", "Erase the past", "Make a million", "...all through C!" }; For example if str1 contains "mountain" and str2 contains "car", then the second string in str should get changed to "Move a car".
	Q 33.	A factory has 3 division and stocks 4 categories of products. An inventory table is updated for each division and for each product as they are received. There are three independent suppliers of products to the factory: (a) Design a data format to represent each transaction. (b) Write a program to take a transaction and update the inventory. (c) If the cost per item is also given design a program to calculate the total inventory values.
	Q 34.	A dequeue is an ordered set of elements in which elements may be inserted or retrieved from either end. Using an array simulate a dequeue of characters and the operations retrieve left, retrieve right, insert left, insert right. Exceptional conditions such as dequeue full or empty should be indicated. Two pointers (namely, left and right) are needed in this simulation.
	Q 35.	Develop a program to delete all vowels from a sentence. Assume that the sentence is not more than 80 characters long.
	Q 36.	Design a program that will read a line and delete from it all occurrences of the word 'the'.
	Q 37.	Design a program that takes a set of names of individuals and abbreviates the first, middle and other names except the last name by their first letter.
	Q 38.	Develop a program to count the number of occurrences of any two vowels in succession in a line of text. For example, in the sentence "Pleases read this application and give me gratuity" such occurrences are ea, ea, ui.
	Q 39.	Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume maximum of 200 customers in the bank. (a) Write a function to print the Account number and name of each customer with balance below Rs. 100. (b) If a customer request for withdrawal or deposit, it is given in

Unit	Question No.	Description
		the form: Acct. no, amount, code (1 for deposit, 0 for withdrawal)
		Design a program to give a message, "The balance is insufficient for the specified withdrawal".
III	Q 40.	An automobile company has serial number for engine parts starting from AA0 to FF9. The other characteristics of parts to be specified in a structure are: Year of manufacture, material and quantity manufactured. (a) Specify a structure to store information corresponding to a part. (b) Design a program to retrieve information on parts with serial numbers between BB1 and CC6
	Q 41.	A record contains name of cricketer, his age, number of test matches that he has played and the average runs that he has scored in each test match. Create an array of structure to hold records of 20 such cricketer and then write a program to read these records and arrange them in ascending order by average runs. Use the qsort() standard library function.
II	Q 42.	There is a structure called employee that holds information like employee code, name, date of joining. Design a program to create an array of the structure and enter some data into it. Then ask the user to enter current date. Display the names of those employees whose tenure is 3 or more than 3 years according to the given current date.
	Q 43.	Linked list is a very common data structure often used to store similar data in memory. While the elements of an array occupy contiguous memory locations, those of a linked list are not constrained to be stored in adjacent location. The individual elements are stored "somewhere" in memory, rather like a family dispersed, but still bound together. The order of the elements is maintained by explicit links between them. Thus, a linked list is a collection of elements called nodes, each of which stores two item of information – an element of the list, and a link, i.e., a pointer or an address that indicates explicitly the location of the node containing the successor of this list element. Develop a program to build a linked list by adding new nodes at the beginning, at the end or in the middle of the linked list. Also write a function display() which display all the nodes present in the linked list.
	Q 44.	Unlike a stack, in a queue the addition of new element takes place at the end (called 'rear' of queue) whereas deletion takes place at the other end (called 'front' of queue). Design a program to implement a queue using a linked list.
	Q 45.	Design two functions xgets() and xputs() which work similar to the standard library functions gets() and puts().
	Q 46.	Design appropriate solution to encrypt/decrypt files using the following: i. An offset cipher: In an offset cipher each character from the source file is offset with a fixed value and then written to the

Unit	Question No.	Description
		target file. For example, if character read from the source file is 'A', then convert this into a new character by offsetting 'A' by a fixed value, say 128, and then writing the new character to the target file.
		ii. A substitution cipher: In this each character read from the source file is substituted by a corresponding predetermined character and this character is written to the target file. For example, if character 'A' is read from the source file, and if we have decided that every 'A' is to be substituted by '!', then a '!' would be written to the target file in place of every 'A'. Similarly, every 'B' would be substituted by '5' and so on.
III	Q 47.	There are 100 records present in a file with the following structure: <pre>struct date { int d, m, y ; }; struct employee { int empcode[6] ; char empname[20] ; struct date join_date ; float salary ; } ;</pre> Design a program to read these records, arrange them in ascending order of join_date and write them in to a target file
	Q 48.	Given a list of names of students in a class, write a program to store the names in a file on disk. Make a provision to display the nth name in the list (n is data to be read) and to display all names starting with S.
	Q 49.	Assume that a Master file contains two fields, Roll no. and name of the student. At the end of the year, a set of students join the class and another set leaves. A Transaction file contains the roll numbers and an appropriate code to add or delete a student. Design a program to create another file that contains the updated list of names and roll numbers. Assume that the Master file and the Transaction file are arranged in ascending order by roll numbers. The updated file should also be in ascending order by roll numbers.
	Q 50.	In a small firm employee numbers are given in serial numerical order, that is 1, 2, 3, etc. <ul style="list-style-type: none"> - Create a file of employee data with following information: employee number, name, sex, gross salary. - If more employees join, append their data to the file. - If an employee with serial number 25 (say) leaves, delete the record by making gross salary 0. - If some employee's gross salary increases, retrieve the record and update the salary. Design a program to implement the above operations
	Q 51.	Design a program using command line arguments to search for a word in a file and replace it with the specified word. The usage of the program is shown below. C> change <old word> <new word> <filename>

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Q 52. An animal could be either a canine (dog, wolf, fox, etc.), a feline (cat, lynx, jaguar, etc.), a cetacean (whale, narwhal, etc.) or a marsupial (koala, wombat, etc.). The information whether a particular animal is canine, feline, cetacean, or marsupial is stored in bit number 0, 1, 2 and 3 respectively of a integer variable called type. Bit number 4 of the variable type stores the information about whether the animal is Carnivore or Herbivore. For the following animal, complete the program to determine whether the animal is a herbivore or a carnivore. Also determine whether the animal is a canine, feline, cetacean or a marsupial.

```

struct animal { char name[30]; int type ; }
struct animal a = { "OCELOT", 18 };

```