VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

BCSE102P STRUCTURED AND OBJECT-ORIENTED PROGRAMMING LAB

CYCLE SHEET-1

PRACTICE PROBLEM SET-1-MODULE 1& 2

PRACTICE PROBLEM SET-2-MODULE 3 & 4

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

VELLORE INSTITUTE OF TECHNOLOGY,

VELLORE

General Instructions

1. Course outcome Details:

Sl.No.	Assesments	Course Outcomes
1.	Practice Problem Set – 1	CO1
2.	Practice Problem Set – 2	CO2
3.	Midterm Assessment	CO3
4.	Practice Problem Set – 3	CO2
5.	Practice Problem Set – 4	CO3
6.	FAT (to be conducted for 50)	CO3

2. Level of the questions is defined based on Bloom's taxonomy ([L1], [L2], [L3], [L4], [L5] and [L6]). It is a hierarchical classification of the different levels of thinking i.e., basic level to creating new solution level.
3. . Students must practice cycle sheet programs in Moodle – Virtual Programming Lab(VPL) to do the assessments.
4. Dead line to be followed:

Components	Modules	Marks	Deadline
Practice Problem Set – 1	1,2	10	13/03/2023 to 22/03/2023 (Before CAT-1)
Practice Problem Set – 2	3,4	10	23/03/2023 to 14/04/2023 (After CAT-1)
Mid Term Assessment	1-4	20	17/04/2023 to 21/04/2023(After CAT-1)
Practice Problem Set – 3	5,6	10	24/04/2023 to 03/05/2023 (Before CAT-2)
Practice Problem Set – 4	7,8	10	04/5/2023 to 31/05/2023 (After CAT-2)
FAT (To be conducted for 50)	All	40	12/06/2023 to 16/06/2023

5. Programs given in Practice Problem Set can be used to attain basic knowledge. programs are only for practice. Students must explore and practice more programs which will help to attempt the exams. Challenging problems / Higher order Thinking [HoT] questions will be asked during Assessments.

CYCLE SHEET 1

1. Construct a program to read the numbers until -1 is encountered. Find the average of positive numbers and negative numbers entered by user. (Module-1, Easy)
Sample Input: Enter -1 to exit… Enter the number: 7 Enter the number: -2 Enter the number: 9 Enter the number: -8 Enter the number: -6 Enter the number: -4 Enter the number: 10 Enter the number: -1 **Sample Output:** The average of negative numbers is: -5.00 The average of positive numbers is : 8.6
case =1 input= 7 -2 9 -8 -6 -4 10 -1 output= 8.6 -5.00
case=2 input= 45 34 23

90
-2
40
-7
-1
output=
46.4
-4.2

case=3
input=
1
2
3
-1
Output=
6.0
0

2. Develop a program to print an arrangement of its members into a sequence or linear order, and the order is not repeated again. (Module-1, Hard)

Sample Input:

Given Number: 143

Sample Output:

Combinations are:

134

143

314

341

413

431

case=1
input=
143
Output=
134

143
314
341
413
431

Case=2
Input=
6751
Output=
6751
6715
6571
6571
6157
6175
7516
7561
7156
7165
7651
7615
5671
5617
5761
5716
5176
5167
1567
1576
1756
1765
1657
1675

case=3
input=
111

output=

No possible combinations

3. Calculate tax given the following conditions:

If income is less than or equal to 1,50,000 then no tax

If taxable income is 1,50,001 – 3,00,000 then charge 10% tax for the remaining slab

If taxable income is 3,00,001 – 5,00,000 then charge 20% tax for the remaining slab

If taxable income is above 5,00,001 then charge 30% tax for the remaining slab

(Module -1, Medium)

Sample Input: Enter the income: 200000

Sample Output: Tax= 5000.

case=1

input=

200000

output=

5000

case=2

input=

300000

output=

15000

case=3

input=

125000

output=

no tax

4. In an organization they decide to give bonus to all the employees on New Year. A 5% bonus on salary is given to the grade A workers and 10% bonus on salary to the grade B workers. Write a program to enter the salary and grade of the employee. If the salary of the employee is less than $10,000 then the employee gets an extra 2% bonus on salary Calculate the bonus that has to be given to the employee and print the salary that the employee will get. (Module-1 Hard)

Sample Input:

Enter the grade of the employee: B

Enter the employee salary: 50000

Salary=50000

Sample Output:

Bonus=5000.0

Total to be paid:55000.0

case=1

input=

B

50000

output=

5000

55000

case=2

input=

B

10000

output=

200

10200

case=3

input=

C

10000

output=

No such category

5. A company is recruiting persons base on daily wages. The wage is fixed based on the hours of service. For the first 5 hours the wage is Rs.500. for the additional hours his wage is 10% for 1 hour, 20% for two hours and 30% for three hours. The person can work upto 8 hours per day. Write C program to read the details of two workers and calculate total payment of workers using structure.(Module-1, Medium)

Sample Inputs:

Enter the worker name: Sai

Enter the hours of work: 8

Enter the worker name: Ram

Enter the hours of work: 6

Sample output:

Name of first worker: Sai

Received wages of : Rs. 650

Name of second worker: Ram

Received wages of : Rs. 550

case =1

input=

sai

8

ram

6

output=

sai

650

ram

550

case =2

input=

sai

10

ram

6

output=

sai

not applicable

ram

550

case=3

input=

sai

1

ram

8

output=

sai

not applicable

ram

550

6. It's a season of Cricket. There are many matches held up. 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. (Module -4, Medium)

Sample Input:

Name of the player	**Scores**
Rohit Sharma(c)	50
MS Dhoni	30
Srikar Dawan	45
Shubman Gill.	20
Cheteshwar Pujara.	45
Virat Kohli.	18
Shreyas Iyer.	43
Srikar Bharat(w)	31
Ashwin	18
Ravindra Jadeja.	3
Axar Patel.	22

Sample Output

Total runs scored: **325**

Man of the Match: Rohit Sharma

case=1

input=

Rohit Sharma(c)

50

MS Dhoni

30

Srikar Dawan

45

Shubman Gill.

20

Cheteshwar Pujara.

45

Virat Kohli.

18

Shreyas Iyer.

43

Srikar Bharat(w)

31

Ashwin
18
Ravindra Jadeja.
3
Axar Patel.
22
output=
325
Rohit Sharma(c)

case=2
input=
Rohit Sharma(c)
50
MS Dhoni
55
Srikar Dawan
45
Shubman Gill.
20
Cheteshwar Pujara.
45
Virat Kohli.
18
Shreyas Iyer.
43
Srikar Bharat(w)
31
Ashwin
18
Ravindra Jadeja.
3
Axar Patel.
22
output=
350
MS Dhoni

case=3

input=

Rohit Sharma(c)

50

MS Dhoni

55

Srikar Dawan

55

Shubman Gill.

20

Cheteshwar Pujara.

45

Virat Kohli.

18

Shreyas Iyer.

43

Srikar Bharat(w)

31

Ashwin

18

Ravindra Jadeja.

3

Axar Patel.

22

output=

360

Cannot be predicted

7. A Valedictory function has been arranged to greet the Highest paid salary employee to encourage his efforts Write a C program to accept details of 'n' Employee (E. No, Emp Name, Salary) and display the details of employee having highest salary. Use array of structure. (Module -4, easy)

Sample Input:

How many employee details entered :3

Enter the details of Employee1:

Employee No: 101

Employee name: Chandra

Salary: 56600

Enter the details of Employee2:

Employee No: 102

Employee name: Sai

Salary: 55500

Enter the details of Employee3:

Employee No: 103

Employee name: Rahul

Salary:63700

Sample Output :

Highest salary Employee Details

Emp no	Name	Salary
103	Rahul	Rs.63700

case=1

input=

101

Chandra

56600

102

Sai

55500

103

Rahul

63700

output=

103

Rahul

63700

case=2

input=

101

Chandra

56600

102

Sai

56600

103

Rahul

5660

output=

Cannot Determine

case=3

input=

101

Chandra

56600

102

Sai

56600

103

Rahul

56600.00

output=

Invalid

8. Write a C-program to create student structure having field roll_no, stud_name, Course. Pass this entire structure to function and display the structure elements. (Module -4, Easy)

Sample input:

Enter Student details:

Roll no: 45

Name: Ram

Course:BCSE

OUTPUT:

Student Detail:

Roll no: 45

Name: Ram

Course:BCSE

case=1

input= 45 Ram BCSE output= 45 RAM BCSE
case=2 input= 45 Rahul 22BCSE output= 45 RAM Enter a valid course name
case=2 input= #45 1Rahul 22BCSE output= Invalid Structure Element

9. Write a menu driven program in 'C' which shows the working of library. The menu option should be **i) Add book details.** **ii) Display book details.** **iii) List all books of given author.** **iv) List the count of books in the library.** **v) Exit** **(Module -4, Hard)**
Sample input: MENU

```
-----------------------------------
PRESS 1.TO ADD BOOK DETAILS.
PRESS 2.TO DISPLAY BOOK DETAILS.
PRESS 3.TO DISPLAY BOOK OF GIVEN AUTHOR.
PRESS 4.TO COUNT NUMBER OF BOOKS.
PRESS 5.TO EXIT.
-----------------------------------
Enter Your Choice: 1
How Many Records You Want to Add: 2
-----------------------------------
Add Details of 2 Book
-----------------------------------
Enter Book No.     : 101
Book Name          : C PROGRAMMING
Enter Author Name  : DENNIS RITCHIE
Enter No. of Pages : 409
-----------------------------------
Enter Book No.     : 102
Book Name          : LET US C
Enter Author Name  : YESWANT KANITKAR
Enter No. of Pages : 505
```

Sample output:

```
            MENU
-----------------------------------
PRESS 1.TO ADD BOOK DETAILS.
PRESS 2.TO DISPLAY BOOK DETAILS.
PRESS 3.TO DISPLAY BOOK OF GIVEN AUTHOR.
PRESS 4.TO COUNT NUMBER OF BOOKS.
PRESS 5.TO EXIT.
Enter Your Choice: 2
Details of All Book
-------------------------------------------------------------------------------------------------------------
Book No.      Book Name                    Author Name              No. of Pages
101           C PROGRAMMING                DENNIS RITCHIE           409
102           LET US C                     YESWANT KANITKAR         505
-------------------------------------------------------------------------------------------------------------
```

case=1

input=

1

2

101

C PROGRAMMING

DENNIS RITCHIE

409

102

LET US C

YESWANT KANITKAR

case=2

input=

2

output=

101

C PROGRAMMING

DENNIS RITCHIE

409

102

LET US C

YESWANT KANITKAR

case=3

input=

Ram Kumar

output=

No match found

10. Write a C-Program to find the Number of ways of selecting words from n-consonats and m-vowels when r1-consonants and r2 vowels are chosen.

i.e ncr1 * mcr2

Make sure entered numbers are valid to calculate factorial.

(Module-1, Hard)

Sample Input:

Enter number of total consonants =7

Enter the number of chosen consonants=3

Enter number of total vowels =4

Enter the number of chosen consonants=2

Sample Output:

Number of ways of selecting words:210

case =1

input=

7

3

4

2

Output=

210

case =2:

input=

6

2

2

2

output=

15

case=3

input=

7

3

-4

2

output=

Invalid

11. Write a c-program to display the binary format of the user entered number if it is prime else display In hexadecimal format **(Module-1, easy)**
Sample Input 1: Enter number =7 **Sample Output 1:** 111 **Sample Input 2**: Enter number =10 **Sample Output 2:** A
case =1 input= 7 Output= 111
case=2 input= 15 output= F
case=3 input= -5 output= Invaild
12. Write a c-program to determine the digital root of a second largest element in an array consisting of 6 elements. **(Module-1, easy)**
Sample Input 1: Input array=17 15 8 63 32 5

Sample Output 1:

Output=5

Sample Input 2:

Input array=59 59 58 59 59 60

Sample Output 2:

Output=5

case =1

input=

17 15 8 63 32 5

Output=

5

case=2

input=

59 59 59 58 59 60

output=

5

case=3

input=

59 59 59 59 59 59

output=

All same

13. A neon number is a number where the sum of digits of square of the number is equal to the number. Write a c program to check whether given number is neon numbers or not.

(Module-1, Medium)

Sample Input 1:

Input : 9

Sample Output 1:

Neon Number

Sample Input 2:

Input : 8

Sample Output 2:

Not a Neon Number

case =1 input= 9 Output= Yes
case =2 input= 8 Output= No
case =3 input= 0 Output= Invalid
14. Write a c-program to find the smallest possible two digit sum of a 4 digit number. **e.g 5592 is the input 25+59=84 is the smallest two digit sum possible.** **(Module-1, easy)**
Sample Input 1: 5592 **Sample Output 1:** 84 **Sample Input 2**: -5592 **Sample Output 2:** invalid
case =1 input= 5592 Output= 84

case =2 input= 2023 Output= 25
case =3 input=- 4327 Output= Invalid
15. Complete the function void update(int *a,int *b). It receives two integer pointers, int* a and int* b. Set the value of to their product, and to their sum. There is no return value, and no return statement is needed. **(Module-3, easy)**
Input Format The input will contain two integers, and , separated by a newline. **Output Format** Modify the two values in place and the code main() will print their values.
Case =1 Input= 4 5 Output= 20 9
Case =2 Input= 8 7 Output= 56 15
Case =3 Input= 10.5 5.4

Output= Invalid
16. Using pointer, write a C program that reads a character string and a character as input and deletes all occurrence of this character in the string. The program should display the corrected string with no holes. **(Module-3, easy)**
Input format The input will contain a string and a character, both are separated by a newline. **Output format** The corrected string.
Case =1 Input= Hello World o Output= Hell Wrld
Case =2 Input= C Programming m Output= C Prograing
Case =3 Input= University 3 Output= No match
17. Suppose Richard wish to enter a list of country name into the computer, rearrange them into alphabetical order, and then display the rearranged list. Richard made the skeletal of the C program shown below. Complete the function reorder(int n, char *x[])to help Richard for his task. **(Module-3, Medium)**
Input format The input will contain list of country, and separated by a newline. **Output format**

Display the list of country in alphabetically order.
Case =1 **Input=** India Auckland Britain Zimbabwe Australia END **Output:** Auckland Australia Britain India Zimbabwe
Case =2 Input= Japan Nepal Brazil END Output= Brazil Japan Nepal
Case =3 Input= 2 3 END Output= Invalid
18. There are n squirrel(s) waiting below the feet of m chestnut tree(s). The first chestnut of the i-th tree will fall right after Ti second(s), and one more every Pi second(s) after that. The "big mama" of squirrels wants them to bring their nest no less than k chestnuts to avoid the big storm coming, as fast as possible! So they are discussing to wait below which

trees to take enough chestnuts in the shortest time. Time to move to the positions is zero, and the squirrels move nowhere after that.

Request

Use the pointer concept to calculate the shortest time (how many seconds more) the squirrels can take enough chestnuts.

(Module-3, Hard)

Input format

The first line contains the integers m,n,k, respectively.

The second line contains the integers Ti (i=1..m), respectively.

The third line contains the integers Pi (i=1..m), respectively.

(Each integer on a same line is separated by at least one space character)

Output format

The shortest time calculated.

Case =1

Input=

3 2 5

5 1 2

1 2 1

Output=

4

Case =2

Input=

3 2 4

2 1 1

3 1 1

Output=

2

Case =3

Input=

4 2 6

2 4 5

6 7 8

Output=

Invalid

19. Write a function day_name() that receive a number n and return a pointer to a character string containing the name of the corresponding day. The day names should be kept in a static table of character strings local to the function.
(Module-3, Medium)

Input format

The first line contains the integer n.

Output format

The corresponding character string.

Case =1

Input=

2

Output=

Tuesday

Case =2

Input=

1

Output=

Monday

Input=

10

Output=

Invalid

20. Earthquake Research Institute of Japan has recorded earthquake occurred in the year 2021 using Richter scale. Develop a program to get the 'n' (number of times) the earthquake has occurred and print the number of times in which the magnitude was low, medium and high. The magnitude value is given in microns. If the value is less than 5.4(inclusive) in microns then it is low, 5.4 to 7.0 (inclusive) it is medium and more than 7.0 it is high. Also, if the number of times recorded is Zero, display as "No earthquake predicted" and if the number of times recorded is negative, display as "Invalid Input".
(Module-2, Medium)

Sample Input and output:

Input:

Number of times (n) the earthquake has occurred

Magnitude in microns for each earthquake occurred

Output:

Count of low, medium and high

case=1

input= 7 4.3 6.6 8.1 2.1 3.3 7.5 7.6

output= 3 1 3

case=2

input= 5 9.1 8.1 8.3 2.3 7.3

output= 1 0 4

case=3

input= -3

output= Invalid Input

21. Create a C program called BankMgmt with AccNumber, CustName, AvlBalance, AccType as members. Implement a Bank management Application as menu driven program using Array and function concept

Menu Option:

1. **Withdrawal 2. Deposit 3. Display Balance 4. Exit**

If option

1 is chosen- Amount can be withdrawn from the account (Withdrawn amount should be given as input). For withdrawal the condition is- the AvlBalance must be greater than withdrawn amount).

2 is chosen- Amount can be deposited to the account (the deposited amount should be given as input). The deposited amount should be reflected in AvlBalance of the account.

3 is chosen - Current available balance (AvlBalance) of the AccNumber should be Displayed with other details

4 is chosen - Exit from the application

(Module-2, Hard)

Sample Input and output:

Input:

Account num: SB100

Output:

Name: Prasanth Kumar

Available balance: 4500.00

Acount type: SB
case=1 input: 1 Enter amount for withdraw: 5000 Output Amount withdrawn: 5000 & Available balance:26000
case=2 input: 2 Enter amount for deposit: 5000 output Amount deposited: 4000 Available balance is:30000
case=3 input 1 Enter amount for withdraw: 34000 Output Invalid amount request, check balance.
22. Given a cricket team with size M x N with multiple players are already occupied double bedded rooms, separate the even and odd players and make them to occupy in single bedded room (Odd & Even). After separation sort and display in ascending order as shown in output. **(Module-2, Easy)**
Sample input & o/p: Input: Enter the player numbers: 2 9 12 15 16 24 45 5 7 Output: OddPlayers[] = 5 7 9 15 25 45 EvenPlayers[] = 2 12 16 24
Case 1: Input: Enter the player numbers: 6 7 32 91 9 34 3 Output: OddPlayers[] = 3 6 9 7 91 EvenPlayers[] = 6 32 34
Case 2: Input:

Enter the player numbers: 42 6 81 34

Output:

OddPlayers[] = 81

EvenPlayers[] = 6 34 42

Case 3:

Input:

Enter the player numbers: 6 7 32 -1 9 34 -32

Output:

Invalid input, all input must be positive numbers

23. An online educational platform offers three courses: Programming Courses, Robotics Courses and Academic Writing Courses : The vendor gives a discount of 10% on orders for programming based courses if the order is for more than Rs. 1000.

On orders of more than Rs. 750 for Robotics Courses, a discount of 5% is given, and a discount of 10% is given on orders for academic writing courses of value more than Rs. 500. Assume that the numeric codes 1,2 and 3 are used for Programming, Robotics and Academic Writing Courses respectively.

Get the max 5 student registration for each courses Write a program that reads the product code and the order amount and prints out the net amount that the learner is required to pay after the discount.

(Module-2, Medium)

Sample Input/ Output format:

Input:

product code: 1

order amount: 2000

Output:

Thanks, your discounted amount: 1800.00

case=1

input=

1

2000

- output=1800.00

case=2

input=

2

1575

- output=1496.25

case=3

input=

3

-750

- output= Invalid input

24. Write a program to create two grocery storage with minimum five items each. Merge the storage to new space storage in such a way that first storage may be copied as it is and reverse only the second array and merge it. Perform sorting in the new array and print it. Implement the same by passing appropriate arrays to functions. Below is the sample output.

(Module-2, Easy)

Sample Input and output

Input:

Enter the number of elements for First Tank : 4

Enter the items for First Tank: 4 13 12 1

Enter the number of elements for Second Tank : 4

Enter the items for Second Tank : 4 6 7 8 9

Output:

Elements After Merging 4 13 12 1 9 8 7 6

The sorted elements are 1 4 6 7 8 9 12 13

Case 1:

Input:

Enter the number of elements for First Tank : 2

Enter the items for First Tank: 43 56

Enter the number of elements for Second Tank : 2

Enter the items for Second Tank : 12 65

Output:

Elements After Merging 43 56 12 65

The sorted elements are 12 43 56 65

Case 2:

Input:

Enter the number of elements for First Tank : 2

Enter the items for First Tank: 43 56

Enter the number of elements for Second Tank : -1

Invalid input, enter details again

Enter the number of elements for Second Tank : 2

Enter the items for Second Tank : 12 65

Output:

Elements After Merging 43 56 12 65

The sorted elements are 12 43 56 65

Case 3:

Input:

Enter the number of elements for First Tank : -1

Invalid input, Enter details again

Enter the number of elements for First Tank : 1

Invalid, Item must be more than 1

You have given invalid input 2 times and more, you cannot continue. Thanks.

25. Get a DOB from the user which is an 8 digit number. Check whether it is a Lucky number or not by following the steps below:

Step-1: Calculate the sum of the digits in the odd-numbered positions (the first, third, fifth and seventh digits) and multiply this sum by 3.

Step-2: Calculate the sum of the digits in the even-numbered positions (the second, fourth, sixth and eighth digits) and add this to the previous result (got in step 1).

Given Date of Birth is declared as a lucky number, only if the last digit of the result from step 2 is 0.

Develop a program to read the Date of Birth, if the number of digits is not 8 then print "Cannot be processed" and terminate program. If the number of digits is 8 and if the DOB is a lucky number, output the DOB with the message "Lucky Number." If the number of digits is 8 and if the DOB is not a lucky number, output the DOB with the message "Not a Lucky Number."

For example the DOB is 12032003,

the result from step 1 is 9,

the result from step 2 is 17

The output is 12032003, "Not a Lucky Number"

For example the DOB is 13101978,

the result from step 1 is 30,

the result from step 2 is 50,

The output is 13101978, "Lucky Number."

For example if the DOB is 1110197,

The output is "Invalid Input"

(Module-2, Hard)
Sample Input/ Output format **Input:** Enter the Date of Birth: **12032003** **Output:** You have entered **12032003, is "Not a Lucky Number"**
case=1 Enter the DOB: 12032003 output= 12032003, Not a Lucky Number
case=2 input= 13101978 output= 12032003 Lucky Number
case=3 input= 1110197 output= Invalid Input