



# INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Dundigal, Hyderabad - 500 043

## COMPUTER SCIENCE AND ENGINEERING(CS)

### LIST OF EXPERIMENTS

Course Title	Programming for Problem Solving using C Laboratory				
Course Code	ACSC05				
Program	B.Tech				
Semester	II				
Course Type	Foundation Laboratory				
Regulation	UG-22				
Course Structure	Theory			Practical	
	Lecture	Tutorials	Credits	Laboratory	Credits
	-	-	-	3	1.5
Course Coordinator	Ms. J Alekhya, Assistant Professor				

### I COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
B.Tech	-	-	-

### II COURSE OVERVIEW:

The Lab course aims to train the student in the field of programming using C language. This lab is designed to give the hands-on experience to work with IDE to create, edit, compile, run and debug programs; it gives a great idea about the storage of values using data types. This lab covers concepts of programming and software code organization within the framework of structural and procedural programming paradigms. It is widely used in software development including Operating Systems, Compilers/Linkers, Tools and Utilities to control hardware devices. .

### III COURSE OBJECTIVES:

The students will try to learn:

I	IDE(Integrated Development Environment) to create, edit, compile, run and debug C programs.
II	Various steps in program development.
III	The structural programming paradigms to build efficient programs in C language.
IV	The files handling concepts like create read from and write to text and binary files.

#### IV LIST OF EXPERIMENTS:

WEEK I	<b>OPERATORS AND EVALUATION OF EXPRESSIONS</b>
	<p><b>Problem Statement:</b> Ramesh's basic salary is input through the keyboard. Write a program to calculate his gross salary based on the below details(note:tax on income is payable only if the net taxable income for a fiscal exceeds Rs. 2.5 lakh.)</p> <p><b>Note :</b> Net Salary = Gross Salary - Income Tax - EPF - Professional Tax</p> <ol style="list-style-type: none"><li>1. dearness allowance = 40%</li><li>2. house rent = 20%</li><li>3. Transport allowance = 1200</li><li>4. Provisional fund = 200</li><li>5. Income tax = 10%</li></ol> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"><li>1. calculate the gross salary</li><li>2. calculate the gross salary if the salary is above Rs. 1,00,000</li><li>3. calculate the gross salary if the salary is above Rs. 3,00,000</li><li>4. calculate the net salary (Net salary = Gross salary – Income tax – Provident Fund – Professional tax)</li></ol>
WEEK II	<b>CONTROL STRUCTURES</b>

**Problem Statement:** Write a c Program for analysis of people of certain age groups who are eligible for getting a suitable job if their condition and norms get satisfied using nested if statement.

Person name	Person age	statement
Srihan	13	Not eligible for work
Kavya	19	Eligible for work
Srivalli	35	Eligible for work
Chandana	65	Retirement and can collect pension

1. User can enter his age, and we are going to store it in the variable age. If the age is less than 18, we are going to print two statements.
- 2.If the age of a person is less than 18, he is not eligible to work.
3. If the age is greater than or equal to 18, then the first condition fails, it will check the else statement.
4. In this example, the Nested IF Statement checks the person's age greater than or equal to 18 and less than or equal to 60. When the condition is TRUE, then he can apply for the job.
5. If the condition is FALSE, then the statement – he is too old to work as per the government.

**Solutions Expected:**

1. if age is below 18 then he is not eligible for work
2. if age is between 18 to 60 eligible for work
3. if age is above 60 then he is eligible for retirement and can collect pension

WEEK III	<b>CONTROL STRUCTURES</b>																
	<p><b>Problem Statement:</b> Write a C Program to Find Grade of a Student Using Switch Case, The user needs to enter the subject number and the program must return the Grade of the subject based on the number. If a student enters the number between 90 to 100 then our program must return the Grade A or Excellent, similarly for other ranges numbers. To get the help I have a Number to grade conversion table this may help you to find the proper logic and roadmap for our program to Calculate Grade Using Switch Statement in C.</p> <table border="1"> <thead> <tr> <th>Numbers in marks</th><th>Grade conversion</th></tr> </thead> <tbody> <tr> <td>90 - 100</td><td>A</td></tr> <tr> <td>80 - 89</td><td>B</td></tr> <tr> <td>70 - 79</td><td>C</td></tr> <tr> <td>60 - 69</td><td>D</td></tr> <tr> <td>50 - 59</td><td>E</td></tr> <tr> <td>40 - 49</td><td>E-</td></tr> <tr> <td>LESS THAN 40</td><td>F</td></tr> </tbody> </table> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"> <li>1. if Enter the Marks is 1000 Output is Don't Be Smart Enter your Marks Between Limit.</li> <li>2. if Enter the Mark is 95 Output -Your Grade Is A or Excellent</li> <li>3. if Enter the Mark is 25 Output You Grade Is F or Fail</li> </ol>	Numbers in marks	Grade conversion	90 - 100	A	80 - 89	B	70 - 79	C	60 - 69	D	50 - 59	E	40 - 49	E-	LESS THAN 40	F
Numbers in marks	Grade conversion																
90 - 100	A																
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WEEK IV	<b>ARRAYS</b>																																										
	<p>write a c program for the given data of Hotel management and User</p> <table><tr><th>Hotel Name</th><th>Room Available</th><th>Location</th><th>Rating</th><th>price per room</th></tr><tr><td>H1</td><td>4</td><td>Bangalore</td><td>5</td><td>100</td></tr><tr><td>H2</td><td>5</td><td>Hyderabad</td><td>5</td><td>200</td></tr><tr><td>H3</td><td>6</td><td>Bangalore</td><td>5</td><td>400</td></tr><tr><td>H4</td><td>7</td><td>Hyderabad</td><td>5</td><td>500</td></tr><tr><td>H5</td><td>8</td><td>Bangalore</td><td>5</td><td>100</td></tr></table> <p>User Data:</p> <table><tr><th>USER NAME</th><th>USER ID</th><th>Booking cost</th></tr><tr><td>U1</td><td>2</td><td>1000</td></tr><tr><td>U2</td><td>3</td><td>2000</td></tr><tr><td>U3</td><td>4</td><td>4000</td></tr></table> <p>Solutions Expected:</p> <ol style="list-style-type: none"><li>1. Print the hotel data.</li><li>2. Sort hotels by Name.</li><li>3. Sort Hotel by highest rating.</li><li>4. Print Hotel data for Bangalore Location.</li><li>5. Sort hotels by maximum number of rooms Available.</li><li>6. Print user Booking data.</li></ol>	Hotel Name	Room Available	Location	Rating	price per room	H1	4	Bangalore	5	100	H2	5	Hyderabad	5	200	H3	6	Bangalore	5	400	H4	7	Hyderabad	5	500	H5	8	Bangalore	5	100	USER NAME	USER ID	Booking cost	U1	2	1000	U2	3	2000	U3	4	4000
Hotel Name	Room Available	Location	Rating	price per room																																							
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U2	3	2000																																									
U3	4	4000																																									
WEEK V	<b>STRINGS</b>																																										
	<p><b>Problem Statement:</b> Suresh one of the student in IARE college wanted to simplify his work using string operations in his assignment. For example, he is having one paragraph like</p> <ol style="list-style-type: none"><li>1. C is a general-purpose programming language created by Dennis Ritchie at the Bell Laboratories in 1972.</li><li>2. It is a very popular language, despite being old.</li><li>3. C is strongly associated with UNIX, as it was developed to write the UNIX operating system.</li></ol> <p>Solutions Expected:</p> <ol style="list-style-type: none"><li>1. Find the Frequency of a Character in the first line</li><li>2. Find the number of vowels, consonants, digits and white spaces</li><li>3. Concatenate two strings in all lines</li><li>4. Sort all elements in the lexicographical order (dictionary order)</li></ol>																																										

WEEK VI	<b>FUNCTIONS</b>												
	<p><b>Problem Statement:</b> Build a C programming code for real time Bank application. This program has to perform all below operations such as</p> <ol style="list-style-type: none"><li>1. Creating new account – To create a new account</li><li>2. Cash Deposit – To Deposit some amount in newly created account</li><li>3. Cash withdrawal – To Withdraw some amount from your account</li><li>4. Display Account information – It will display all informations of the existing accounts</li><li>5. Log out</li><li>6. Clearing the output screen and display available options</li></ol> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"><li>1. Function to display available options in this application</li><li>2. Function to create new account</li><li>3. Display account informations</li><li>4. Function to deposit amount in an account</li><li>5. Function to withdraw amount from an account</li></ol>												
WEEK VII	<b>POINTERS</b>												
	<p><b>Problem Statement:</b> C Program to print the members of a structure using Pointer and Arrow Operators based on the below dataset. Also use free() function to release the memory.</p> <p><b>Employee data:</b></p> <table><tr><td>EMP NAME</td><td>EMP ID</td><td>SALARY</td></tr><tr><td>sri</td><td>2</td><td>1000</td></tr><tr><td>sai</td><td>3</td><td>2000</td></tr><tr><td>ram</td><td>4</td><td>4000</td></tr></table> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"><li>1. Print the employee name and id</li><li>2. print the employee name and salary</li><li>3. search for the employee who is having the least salary</li></ol>	EMP NAME	EMP ID	SALARY	sri	2	1000	sai	3	2000	ram	4	4000
EMP NAME	EMP ID	SALARY											
sri	2	1000											
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WEEKVIII	<b>STRUCTURES AND UNIONS</b>
	<p><b>Problem Statement:</b> Write a C program that uses functions to perform the following operations:</p> <ol style="list-style-type: none"> <li>Reading a complex number</li> <li>Writing a complex number</li> <li>Addition and subtraction of two complex numbers</li> </ol> <p>Note: represent complex number using a structure.</p> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"> <li>Write a C program to compute the monthly pay of 100 employees using each employees name, basic pay. The DA is computed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.</li> <li>Create a Book structure containing book id, title, author name and price.</li> <li>Write a C program to pass a structure as a function argument and print the book details.</li> <li>Create a union containing 6 strings: name, home address, hostel address, city, state and zip. Write a C program to display your present address.</li> </ol>
WEEK IX	<b>ADDITIONAL PROGRAMS</b>
	<ol style="list-style-type: none"> <li>Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: <math>1+x+x^2+x^3+\dots+x^n</math>. For example: if n is 3 and x is 5, then the program computes <math>1+5+25+125</math>. Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if <math>n \leq 0</math>, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.</li> <li>2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.</li> <li>Write a C program to convert a Roman numeral to its decimal equivalent. E.g. check for the inputs. Roman number IX is equivalent to 9 and Roman number XI is equivalent to 11.</li> </ol>
WEEK X	<b>PREPROCESSOR DIRECTIVES</b>
	<ol style="list-style-type: none"> <li>Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15 meters.</li> <li>Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.</li> <li>Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a C program to illustrate the use of these symbolic constants.</li> </ol>

WEEK XI	<b>FILES</b>												
	<p><b>Problem Statement:</b></p> <p>A teacher want to make the student data simple for that, he is using files concept. The data of the students is</p> <table><tr><td>STUDENT NAME</td><td>STUDENT ID</td><td>Total marks</td></tr><tr><td>Raju</td><td>2</td><td>350</td></tr><tr><td>Rani</td><td>3</td><td>400</td></tr><tr><td>Murali</td><td>4</td><td>450</td></tr></table> <p><b>Solutions Expected:</b></p> <ol style="list-style-type: none"><li>1. C program to read name and marks of n number of students and store them in a file.</li><li>2. C program to read name and marks of n number of students from and store them in a file. If the file previously exists, add the information to the file.</li><li>3. C program to write all the members of an array of structures to a file using fwrite. Read the array from the file and display on the screen.</li></ol>	STUDENT NAME	STUDENT ID	Total marks	Raju	2	350	Rani	3	400	Murali	4	450
STUDENT NAME	STUDENT ID	Total marks											
Raju	2	350											
Rani	3	400											
Murali	4	450											
WEEK XII	<b>COMMAND LINE ARGUMENTS</b>												
	<ol style="list-style-type: none"><li>a. Develop a C program to read a set of arguments and display all arguments given through command line.</li><li>b. Develop a C program to read a file at command line argument and display the contents of the file.</li><li>c. Develop a C program to read N integers and find the sum of N integer numbers using command line arguments.</li><li>d. Develop a C program to read three integers and find the largest integer among three using command line argument</li></ol>												

## TEXTBOOKS

1. Yashavant Kanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.
2. Oualline Steve, "Practical C Programming", O'Reilly Media, 3rd Edition, 1997.
3. King KN, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
4. Kochan Stephen G, "Programming in C: A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
5. Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994

## REFERENCE BOOKS:

1. B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.
2. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
3. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
4. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.



5. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.
6. Dey Pradeep, Manas Ghosh, “Computer Fundamentals and Programming in C”, Oxford University Press, 2nd Edition, 2006.
7. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.

**Signature of Course Coordinator**  
**Ms. J Alekhya Assistant Professor**

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