Aptech

Unleash your potential

Module Presenter's Manual

for

Logic Building and Elementary Programming

Effective from: March 2017
Ver 1.0

Amendment Record

Version No.	Effective Date	Change	Replaced Pages
1.0	March 2017	New	-

Table of Contents

1. Introduction

At the end of this module, student will be able to:

- Explain the basic concept of program, including variable, data types and expressions.
- Explain the basic Flow Control of a C program
- Explain point of C program focusing data and structured programming
- Explain array, structures, pointers, basic arithmetic and other basic data structures

2. Information on Session Allocation

Module	Concepts (No. of Hrs)	Lab (No. of Hrs)	Total (No. of Hrs)
C*	22	18	40

***** Throughout this Presenter's Manual, the module **Logic Building and Elementary Programming** will be referred to as **C**.

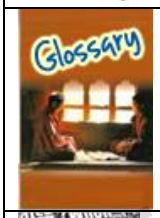
3. Module Deliverables available on OnlineVarsity

To aid the learning process, following are the deliverables

Student Deliverables:

1. Learner's Guide (eBook)

Resources available on OnlineVarsity for Students:

Icons	Feature - Description/Functionality
	***Download Book -*** Student has the option to download the subject related e-book and read offline.
	***Glossary -*** Student can access a list of subject related specialized words with their definitions.
	***FAQ -*** Student can access frequently asked questions and their answers.
	***Feedback -*** Student can provide feedback on the course material.
	***Ask to Learn –*** Student can submit subject related technical queries. Queries submitted will be directed to the particular course coordinator/head.

4. Week-wise Session Schedule

- **A Session has duration of 2 hours.**
- **The Concepts session is to be conducted in the classroom.**
- **Lab session is a hands-on session to be conducted in the lab.**

Wk	Day 1	Day 2	Day 3	Day 4
1	Session 1 C – T1	Session 2 C – T2	Session 3 C – L1	Session 4 C – T3
2	Session 5 C – L2	Session 6 C – T4	Session 7 C – L3	Session 8 C – T5
3	Session 9 C – L4	Session 10 C – T6	Session 11 C – L5	Session 12 C – T7
4	Session 13 C – L6	Session 14 C – T8	Session 15 C – L7	Session 16 C – T 9
5	Session 17 C – L8	Session 18 C – T10	Session 19 C – T11	Session 20 C – L9

T – Theory Session
L – Lab Session

5. Session Coverage

Session No.	Session Details	Deliverables' Mapping
Session-1 (Concepts)	**C – T1** The main objective of this session is to introduce the concept of programming languages. The session begins with introduction to programs and the constituents of any programming language. Additionally this session teaches the concept of algorithms, pseudo codes and flowcharts. Various flowcharting symbols and pseudo code conventions will be taught in this session. On completion of this session, the student will be able to define the components of programming languages and the working of programming languages. Along with this, the student will be able to draw flowcharts and write pseudo codes.	**SG – Session 1** **XP – Session 1** **TG – Session 1**
Session-2 (Concepts)	**C – T2** The previous session provides the basic knowledge with respect to programming languages in general. A slight inclination towards the C programming language is found in session 1. This session advances the basic knowledge of the students towards the C language specific data storage mechanisms and their basic types. These data structures include the introduction of variables and constants in C. On completion of this session, the student will be able to define variables and constants. The student will also be able to use basic arithmetic operators with the variables and constants.	**SG – Session 2** **XP – Session 2** **TG – Session 2**
Session-3 (Lab)	**C – L1** This session aims at providing hands on experience to the student on the concepts learnt in the previous two sessions.	**SG – Session 3**
Session-4 (Concepts)	**C – T3** After session 3, the students have the basic knowledge of variables and mathematical operators. This session is the logical continuation with the other kind of operators available in C. Assignment, Relational and Logical operators have been covered in this session. Suitable expressions have been provided in this session to support the knowledge of operators offered in this session. The concluding part of the session explains the precedence of operators with respect to the C language. On completion of this session, the student will understand the assignment, relational and logical operators in C.	**SG – Session 4** **XP – Session 3** **TG – Session 3**

Session No.	Session Details	Deliverables' Mapping
	Subsequently the students will be able to solve out the precedence of operators in a given C expression.	
Session-5 (Lab)	**C – L2** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 5**
Session-6 (Concepts)	**C – T4** All the topics from Session 6 and Session 7 of the book should be covered in this session. **Session 6** This session aims the most frequently used Input Output functions in C. The formatted I/O functions, printf(), scanf(), getchar() and putchar() will be taught in this session. On completion of this session the student will be able to write formatted printf() and scanf() functions. **Session 7** This session aims at the selection constructs available in C. The two most popular branching/selection constructs covered in this session are the '**if**' and '**switch**' statements. The '**switch'** statement is used with '**case**'. On completion of this session the student will be able to write selection constructs using if, nested ifs, if-else, multiple ifs and switch-case.	**SG – Session 6** **XP – Session 4** **TG – Session 4** **SG – Session 7** **XP – Session 5** **TG – Session 5**
Session-7 (Lab)	**C – L3** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 8**

Session No.	Session Details	Deliverables' Mapping
Session-8 (Concepts)	**C – T5** This session introduces the looping constructs available in C. Different looping options like 'for', 'while', 'do-while' have been explained in this section using examples. The session also incorporates the nested looping constructs. The complimentary options with loops have been the exit statements in loops. These constructs include the '**break**', '**continue**' and the '**exit()**' function. This session includes these exit constructs. Suitable examples are available in the student guide that provides a better understanding of the looping and the exit constructs. On completion of this session the student will be able to write C programs which involve loops having the '**break**' and '**continue**' statements.	**SG – Session 9** **XP – Session 6**
Session-9 (Lab)	**C – L4** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 10**
Session-10 (Concepts)	**C – T6** This session focuses on storing similar data in groups. This leads to the introduction to the array data structure. The session begins by defining the array and the index structure used to refer to this array. Followed by this handling of arrays in C has been explained. On completion of this session the student will be able to write and initialize String/Character arrays and multidimensional arrays.	**SG – Session 11** **XP – Session 7**
Session-11 (Lab)	**C – L5** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 12**

Session No.	Session Details	Deliverables' Mapping
Session-12 (Concepts)	**C – T7** The session begins with the introduction to the concept of pointers and proceeds to implement it in C. Application domains of pointers have been discussed to add practical value to the concept. Comparison of pointers and pointer arithmetic follows next. Thus a strong foundation for the concept of pointers is laid down. The session then advances to passing pointers as arguments to functions. Memory allocation and relation of pointers with character arrays and strings has been discussed in the concluding section of this session. On completion of this session the student will be able to declare and initialize pointers in C. Along with this; the students will be able to pass pointers as function arguments. The student will also be able to relate the pointers with character arrays and define the memory allocation for pointers.	**SG – Session 13** **XP – Session 8**
Session-13 (Lab)	**C – L6** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 14**
Session-14 (Concepts)	**C – T8** After the session on pointers, this session aims at explaining the concept and implementation of pointers with user defined functions in C. The session begins by highlighting the need of pointers. Followed by this, the structure of functions is explained. This subsequently leads to the declaration of functions and their prototypes. The two methods of calling functions is the next section in this session. These two methods being: ▪ Call by Value ▪ Call by Reference When arguments are passed to functions, the scope of variables changes based on the method of calling the function. This has been explained in this session. Multi file C programs are also a part of this session. The session concludes with storage classes and function pointers. On completion of this session the student will be able to write functions and call them in the main program. The students will also be able define storage classes for function variables and write multi file C programs.	**SG – Session 15** **XP – Session 9**

Session No.	Session Details	Deliverables' Mapping
Session-15 (Lab)	**C – L7** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 16**
Session-16 (Concepts)	**C – T9** This session aims at the concept of strings in C. The session starts with the explanation of string variables and constants. Pointers are extensively used with strings in C programming. Hence, pointers to strings follow next. String input and output functions have also been covered and the ground stone to explain the string functions is laid down .After the explanation of various string functions, passing arrays as function arguments has been explained. Since character arrays are strings in C, passing strings as function arguments is covered in the concluding section of this session. On completion of this session the student will be able to define strings in C, initialize them, manipulate strings using string functions, and pass strings as function arguments.	**SG – Session 17** **XP – Session 10**
Session-17 (Lab)	**C – L8** This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 18**
Session-18 (Concepts)	**C – T10** This session brings out the need for and implementation of structures. The syntax to declare structures and the assignment of values to structure elements has been explained in this session. The method to access the structure elements follows next. Initializing structures and passing of structures as function arguments is also explained. More complex topics like arrays of structures and initializing them follow next. Since the students are familiar with pointers, pointers to structures are also a part of the coverage of this session. This is known as '**pointers to structures**'. The method to pass the pointers to structures as function arguments is covered later in this session. The concluding section of this session covers the keyword '**typedef**' along with the implementation of the **'Insertion Sort**' and **'Bubble Sort**' algorithms. On completion of this session, the student will be able to define, initialize and use structures. The students will also be able to define array of structures and pass structures as function arguments. Additionally the students will be able to define enumerated data types and write C code to perform Bubble Sort and Insertion Sort.	**SG – Session 19** **XP – Session 11**

Session No.	Session Details	Deliverables' Mapping
Session-19 (Concepts)	**C – T11** This session covers the file I/O concepts in C. The session begins with the explanation of streams and the relation they bear with files. A brief discussion on text streams and binary streams is covered in this session. Subsequently the topic of file pointers and various file functions has been explained. The session concludes with advanced topics like current file pointer and command-line arguments. On completion of this session the student will be able to explain the concept of streams. The student will also be able to create, edit, open and close files using the file I/O commands available in C.	**SG – Session 21** **XP – Session 12**
Session-20 (Lab)	**C – L9** All the lab exercises of Session 20 and Session 22 should be covered in this session. This session aims at providing hands on experience to the student on the concepts learnt in the previous session.	**SG – Session 20** **SG – Session 22**

6. Library References

- **C – The Complete Reference**, Herbert Schildt
- **Programming with C**, Byron Gottfried
- **Programming in C**, Balaguruswamy

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