

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

Course Title: PROGRAMMING IN C
(Code: 3331105)

Diploma Programme in which this course is offered	Semester in which offered
Electronics and Communication	3 rd Semester

1. RATIONALE:

C forms the basics of C++, C#, Visual C/C++ etc which is current requirement in the information technology (IT) and computer science (CS). It is one of the most commonly used programming language in industry by engineers. It is a middle level language which combines features of both the high level and low level language. It is widely used to develop system programming, operating systems, embedded systems. Also, C is used for creating computer applications that are used in writing embedded software/firmware for various micro-controllers based products in electronics, industrial and communications. C is also used in developing verification software, test code and simulators for various applications and hardware products. It is therefore very important for electronic engineers to develop mastery over C language.

2. COMPETENCY (Programme Outcome according to NBA Terminology):

The course should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies:

- **Develop programs in C language.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – I Concepts , Constants, Variables and Data Types	1a. Prepare flowcharts 1b. Develop algorithms	1.1 Concepts of programming methodology. 1.2 Flowchart 1.3 Algorithm
	1c. Learns concept of constants and variables	1.4 Character set 1.5 'C' tokens 1.6 Keywords & Identifiers 1.7 Constants 1.8 Variables, Declaration of variables 1.9 Assigning values to variables
	1d. Distinguishes different data types and storage class	1.10 Data types 1.11 Storage Class, Declaration of storage 1.12 class
Unit – II Operators and Expressions	2a. Creates arithmetic and logical programs	2.1 Arithmetic operators 2.2 Relational operators 2.3 Logical operators 2.4 Assignment operators 2.5 Increment and Decrement operators 2.6 Conditional operators 2.7 Bitwise operators and Special Operators 2.8 Evaluation of arithmetic and logical expressions 2.9 expressions
	2b. Operates input and output Functions	2.10 Formatted input & output 2.11 Unformatted input & output 2.12 I/O Functions: scanf(), printf(), getch(), putch(), gets(), puts() Programming exercises based on arithmetic and logical expressions
Unit – III Branching and Looping	3a. Develops decision making sub routines	3.1 IF statement 3.2 IF..else statement 3.3 Nesting of if..Else statement 3.4 Else if ladder 3.5 Switch Statement 3.6 The? : Operator 3.7 Go To statement. 3.8 Programming based on decision making
	3b. Implements looping in programs	3.9 While statement 3.10 Do and Do while statement 3.11 For statement 3.12 Jumps in Loops 3.13 Use of break and continue statements in looping 3.14 Complex programming exercises

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – IV Arrays and Pointers	4a. Creates ability of handling large size data of similar nature.	4.1 Introduction to Arrays and Strings 4.2 One dimensional arrays of int, float & characters 4.3 Initializing two dimensional arrays 4.4 Programming exercises based on One dimensional arrays
	4b. Understands efficient use of memory, access and distinguish real world data types	4.5 Introduction to pointers 4.6 Declaration and initialization of pointers 4.7 Structure definition & initialization 4.8 Programming exercises based on Pointers and structures
Unit – V User Defined, Library Functions and File Management	5a. Creates own functions and able to operate available library functions	5.1 Introduction of User Defined functions (UDF) 5.2 Call by value & Call by reference 5.3 Library Functions: clrscr(), abs(), sqrt(), og(), pow(), int(), isdigit(), isalpha(), toupper(), tolower(), strlen(), strcat(), strcpy, strcmp 5.4 Differences between library function & 5.5 UDF 5.6 Recursive function (Only Factorial Example) 5.7 Programming exercises based on UDF and library functions
	5b. Develops ability to operate real world projects	5.8 Introduction of file management. 5.9 Defining, Opening and Closing a file 5.10 Input and Output Operations on files 5.11 Programming exercises based on file management

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Concepts, Constants, variables and data types	8	3	5	6	14
II	Operators and expressions	9	2	4	10	16
III	Branching and looping	12	4	6	10	20
IV	Arrays, Pointers and Structures	8	3	4	5	12
V	User defined functions, library functions and file management	5	2	2	4	8
	Total	42	14	21	35	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (**Course Outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies (**Programme Outcomes**). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

Following is the list of Practical/exercise for guidance.

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs. Required
1	I	Use the software for editing compiling and running C programs.	2
2	I	Use different menu options of software	2
3	I	Initialize local variables	2
4	II	Perform simple arithmetic using local variables	2
5	II	Output data using printf and cout statement	2
6	II	Input data using scanf and cin statements	2

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs. Required
7	II	Out put the data on screen using printf in required formats	2
8	II	Use of various mathematical operators in C	2
9	II	Perform floating point arithmetic programs	2
10	II	Evaluate simple formula using C programs	2
11	II	Develop & Test programs using Conditional or Logical expressions	2
12	III	Develop & Test programs with control structure like if , if-else	2
13	III	Develop & Test programs with control structure like nested if-else	2
14	III	Develop & Test programs with else if ladder	2
15	III	Develop & Test Programs with switch & break statement	2
16	III	Develop & Test program with while loop	2
17	III	Develop & Test program with do while loop	2
18	III	Develop & Test program with for loop	2
19	III	Develop & Test program using break and continue statements	2
20	IV	Develop & Test programs to declare and initialize arrays	2
21	IV	Develop & Test programs with one and two dimensional arrays	2
22	IV	Develop & Test programs with character type arrays	2
23	IV	Develop & Test programs to use library functions of C	2
24	IV	Develop & Test programs related to pointer variables	2
25	IV	Develop & Test programs related to structure variables	2
26	V	Develop & Test programs with user defined functions	2
27	V	Develop & Test programs to pass the value of local variables into your C functions	2
28	V	Create and read/write ASCII character file	2
Total			56

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

1. Multiple choice questions, short questions and answers
2. Technical Quiz, seminar and debate
3. Rapid code development and debugging competition.
4. The course activities include: Formal Lecture: 30% Supervised Classroom Work:
5. 30% Supervised Laboratory Tutorials: 30% Unsupervised Directed Learning: 10%

8 SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

- i. Concepts will be introduced in lectures using charts/ppt.
- ii. Quiz on various topics
- iii. Students should be helped in developing logic on individual basis (some sessions may be as tutorials)
- iv. Practical work will be through laboratory sessions.

9. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Programming in C	Balagurusamy, E (Fifth Edition)	Tata McGraw-Hill, New Delhi, 2012
2	Programming in C	Gottfried Byron (Third Edition)	Tata McGraw-Hill, New Delhi, 2012
3	Introduction to C Programming (With CD ROM support)	Reema Thareja (First Edition)	Oxford University Press, 2012
4	Programming in C	Ashok N Kamthane (Second Edition)	Pearson
5	Let Us C	Kanetkar Yashvant (Twelfth Edition)	BPB Publications, 2012
6	Programming in C	Kernighan Brian and Ritchie Dennis (Second Edition)	Prentice Hall of India Pvt. Ltd., New Delhi, 2012

B. List of Major Equipment/Materials

- i. Computers with C and C++ language programming facilities. (Separate computer for each student)
- ii. Multimedia projector, Tutorial Video CD (Programming in C), Expert video lectures.

C List of Software/Learning Websites

- i. Software/tools : Turbo C or Borland C, Visual Studio
- ii. Theory and programming concepts: www.nptel.iitm.ac.in
- iii. www.nptelvideos.com/programming/c_programming_videos.php
- iv. www.ocw.mit.edu (Practical Programming in C - MIT Open Course Ware)
- v. www.cprogramming.com
- vi. <http://www2.its.strath.ac.uk/courses/c/>
- vii. <http://www.iu.hio.no/~mark/CTutorial/C-Tut-4.02.pdf>

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S. N. Sampat**, Sr. Lecturer, Government Polytechnic, Gandhinagar
- **Prof. G.V. Parmar**, Lecturer, Government Polytechnic, Jamnagar
- **Prof. R. B. Shah**, Sr. Lecturer, Government Polytechnic, Ahmedabad.
- **Prof. (Smt.) P. G. Patel**, Lecturer, Government Polytechnic, Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Shailendra Singh**, Professor & Head Dept. of Computer Engineering and Applications
- **Dr. Priyanka Tripathi**, Associate Professor, Dept. of Computer Engineering and Applications