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| **Programme** | : | **Diploma in Electronics & Telecommunication** |
| **Programme Code** | : | 01/02/**03**/04/05/06/07/08/16/**17**/21/22/**23**/24/26 |
| **Name of Course** | : | **Programming in C** |
| **Course Code** | : | **ET 286** |

**Teaching Scheme:**

|  |  |  |
| --- | --- | --- |
|  | **Hours/week** | **Total Hours** |
| **Theory** | **03** | **48** |
| **Practical/Tutorial** | **02+01** | **48** |

**Evaluation Scheme:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Progressive Assessment** | **Semester End Examination** | | | |
| **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | **Three class tests of 60 minutes** | **03 Hrs.** | **---** | **---** | **---** |
| **Marks** | **20** | **80** | **50** | **---** | **25** |

**Course Rationale:**

Studying programming is useful in solving problems/tasks related to various domains. ‘C’ computer programming language provides general formal solution in the fields of electronics and telecommunication engineering, due to its features like- support of structured programming, low level capabilities, minimal runtime support, easy hardware access etc. ‘C’ has been used as a basic tool to develop software in electronics domain.

**Course Objectives:**

After studying this course, the students will be able to-

* Write programs in ‘C’ programming language
* Diagnose the programming errors and correct it
* Effectively make use of primary, derived and user defined data types
* Solve the programming tasks in structured way

**Course Content:**

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| --- | --- | --- | --- |
| Chapter No. | Name of Topic/Sub topic | Hrs | Marks |
| **1** | **OVERVIEW OF ‘C’** | | |
|  | 1.1 Introduction to C programming language: Development | 03 | 06 |
| 1.2 Importance of ‘C’ |
| 1.3 Basic structure of ‘C’ program, programming style, Sample ‘C’ programs, Execution process of ‘C’ program |
| **2** | **‘C’ CHARACTER SET AND DATA TYPES** |  |  |
|  | 2.1 Character set | 05 | 10 |
| 2.2 C Tokens |
| 2.3 Keywords and Identifiers |
| 2.4 Constants and Variables |
| 2.5 Data types |
| 2.6 Declaration, initialization/assigning values to variables |
| 2.7 Defining symbolic constants |
| **3** | **OPERATORS AND EXPRESSIONS** |  |  |
|  | 3.1 Operators- Arithmetic, Relational, Logical, Assignment, Conditional, Increment and decrement | 08 | 12 |
| 3.2 Expressions- Arithmetic expressions, Evaluation of expressions, Operators precedence and associativity |
| 3.3 Library functions- Some mathematical functions |
| 3.4 Managing input and output operations- reading a character (getchar), writing a character (putchar), formatted input (scanf), formatted output (printf) |
| **4** | **DECISION MAKING, BRANCHING AND LOOPING** |  |  |
|  | 4.1 Introduction to decision making and branching | 08 | 12 |
| 4.2 Decision making with simple if statement, if...else statement, Nested if...else statement, |
| 4.3 The switch statement |
| 4.4 ? : Conditional operator |
| 4.5 goto statement |
| 4.6 Introduction to Looping |
| 4.7 while statement |
| 4.8 do...while statement |
| 4.9 for statement |
| 4.10 Jumps in loops: using break and continue statements |

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| **5** | **ARRAYS** |  |  |
|  | 5.1 Introduction | 04 | 08 |
| 5.2 One-dimensional arrays: Declaration, initialization |
| 5.3 Two-dimensional arrays: Declaration, initialization |
| 5.4 Multi-dimensional arrays |
| 5.5 Programs based on one dimensional arrays only |
| **6** | **STRINGS** |  |  |
|  | 6.1 Introduction | 04 | 08 |
| 6.2 Declaring and initialization of string variables |
| 6.3 Reading and writing strings |
| 6.4 String handling functions- strcat, strcmp, strcpy, strlen |
| **7** | **USER DEFINED FUNCTIONS** |  |  |
|  | 7.1 Introduction | 08 | 12 |
| 7.2 Types of functions in ‘C’ |
| 7.3 Need of User defined functions |
| 7.4 Elements of user defined functions |
| 7.5 Calling a user defined function |
| 7.6 Categories of user defined functions- No argument- No return value, Argument- No return value, No argument- Return value, Argument- Return value |
| 7.7 Recursion |
| **8** | **STRUCTURES AND UNIONS** |  |  |
|  | 8.1 Introduction | 04 | 08 |
| 8.2 Structure definition |
| 8.3 Declaring structure variables |
| 8.4 Accessing structure members |
| 8.5 Structure variables initialization |
| 8.6 Arrays of structures |
| 8.9 Introduction to Unions |
| **9** | **INTRODUCTION TO POINTERS** |  |  |
|  | 9.1 Pointer concept | 04 | 04 |
| 9.2 & (Address) and \* (Indirection) operators |
| 9.3 Declaration of pointer variables |
| 9.4 Initialization of pointer variables |
| 9.5 Accessing a variable through its pointer |
|  | **Total:** | **48** | **80** |

**List of Practicals/Experiments/Assignments:**

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| --- | --- | --- |
| **Sr. No.** | **Name of Practical/Experiment/Assignment** | **Hrs** |
| 1 | Demonstration of GCC Compiler, creating a program, compiling, Linking and executing programs. | 02 |
| 2 | Write ‘C’ programs based on declaring variables and assigning values to variables (Minimum 3) | 02 |
| 3 | Write programs based on expressions and operators.  Programs using scanf(), printf(), getch(), putch(). (Minimum 4) | 02 |
| 4 | Programs using following control statements:  if...else statements, switch statement, ?: operator, goto statement, while, do...while, for looping statements (Minimum 5) | 06 |
| 5 | Write programs based on arrays (Minimum 3) | 04 |
| 6 | Write programs using strings operations such as concatenation, comparison, copying etc (Minimum 3) | 04 |
| 7 | Examples of user defined functions. Demonstration of return types.  Write programs demonstrating four categories of functions.  Programs based on recursion (Minimum 5) | 04 |
| 8 | Write programs based on structure definition and initialization.  (minimum 2) | 04 |
| 9 | Write programs based on pointers (Minimum 2) | 04 |
|  | **Total:** | **32** |

**Note:**

* All practicals should be performed on GCC compiler.
* Minimum 25 programs specified should be executed
* Actual program statements on practical topics should be framed by respective teachers.
* During Tutorial session various examples should be taken as per the concepts of Theory.

**Instructional strategy:**

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| --- | --- | --- |
| **Sr. No.** | **Topic** | **Instructional strategy** |
| 1 | Overview of ‘C’ | Demonstration of GCC compiler, Create simple programs |
| 2 | ‘C’ character set and Data types | Write ‘C’ programs based on declaring variables & assigning values to variables |
| 3 | Operators and Expressions | Explanation of operators, expressions and managing input and output operators |
| 4 | Decision making, Branching and Looping | Theoretical explanation and writing programs using different control statements |
| 5 | Arrays | Theoretical explanation and implementation of arrays |
| 6 | Strings | Theoretical explanation and implementation of string variables |
| 7 | User defined functions | Explanation and implementation of examples on user defined functions |
| 8 | Structures & Unions | Theoretical explanation and implementation of structures |
| 9 | Pointers | Explanation and implementation of examples on pointers |

**Text Books:**

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| --- | --- | --- | --- |
| **Sr. No.** | **Author** | **Title** | **Publication** |
| 1 | E. Balgurusamy | Programming in ANSI ‘C’ | Tata-McGraw Hill Pub. (Second Edition) |

**Reference Books:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Author** | **Title** | **Publication** |
| 1 | Byron S. Gottfried | Programming with C | McGraw-Hill Publication |
| 2 | Yeshwant Kanetkar | Let us ‘C’ | BPB Publication |
| 3 | Madhusudan Mothe | C for Beginners | SPD Publication |

**Learning Resources:**

Black board, Transparencies and Overhead projector, LCD projector, White board.

**Note: In semester end theory evaluation 70% weightage should be given to theoretical concepts & 30% weightage should be given to programming skills.**

**Specification Table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Topic** | **Cognitive Levels** | | | **Total** |
| **Knowledge** | **Comprehension** | **Application** |
| 1 | Overview of ‘C’ | 01 | 01 | 02 | 04 |
| 2 | ‘C’ character set and Data types | 02 | 01 | 03 | 06 |
| 3 | Operators and Expressions | 03 | 03 | 04 | 10 |
| 4 | Decision making, Branching and Looping | 02 | 04 | 02 | 08 |
| 5 | Arrays | 03 | 04 | 05 | 12 |
| 6 | Strings | 02 | 02 | 02 | 06 |
| 7 | User defined functions | 04 | 04 | 04 | 12 |
| 8 | Structures & Unions | 05 | 04 | 03 | 12 |
| 9 | Pointers | 03 | 02 | 05 | 10 |
| **TOTAL** | | **25** | **25** | **30** | **80** |

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| 1. 1. V. N. Gangapure 2. 2. S. C. Dhir |  | R. N. Shikari |
| Prepared by | Member Secretary, PBOS | Chairman, PBOS |