| BMC102 : PROBLEM SOLVING USING C | | |
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| **Course Outcome (CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course, the student will be able to** | | |
| CO 1 | Describe the functional components and fundamental concepts of a digital computer system including number systems. | $K_1$, $K_2$ |
| CO 2 | Construct flowchart and write algorithms for solving basic problems. | $K_2$, $K_3$ |
| CO 3 | Write 'C' programs that incorporate use of variables, operators and expressions along with data types. | $K_2$, $K_3$ |
| CO 4 | Write simple programs using the basic elements like control statements, functions, arrays and strings. | $K_2$, $K_3$ |
| CO 5 | Write advanced programs using the concepts of pointers, structures, unions and enumerated data types. | $K_2$, $K_3$ |
| CO 6 | Apply pre-processor directives and basic file handling and graphics operations in advanced programming. | $K_2$, $K_3$ |
| **DETAILED SYLLABUS** | | **3-1-0** |
| **Unit** | **Topic** | **Proposed Lecture** |
| **I** | **Basics of programming:** Approaches to problem solving, Use of high-level programming language for systematic development of programs, Concept of algorithm and flowchart, Concept and role of structured programming.<br>**Basics of C**: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input/Output, Operators and expressions. | **08** |
| **II** | **Conditional Program Execution:** if, if-else, and nested if-else statements, Switch statements, Restrictions on switch values, Use of break and default with switch, Comparison of switch and if-else.<br>**Loops and Iteration:** for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement.<br>**Functions:** Introduction, Types, Declaration of a Function, Function calls, Defining functions, Function Prototypes, Passing arguments to a function Return values and their types, Writing multifunction program,<br>Calling function by value, Recursive functions. | **08** |
| **III** | **Arrays:** Array notation and representation, Declaring one-dimensional array, Initializing arrays, Accessing array elements, Manipulating array elements, Arrays of unknown or varying size, Two-dimensional arrays, Multidimensional arrays.<br>**Pointers:** Introduction, Characteristics, * and & operators, Pointer type declaration and assignment, Pointer arithmetic, Call by reference, Passing pointers to functions, array of pointers, Pointers to functions, Pointer to pointer, Array of pointers.<br>**Strings:** Introduction, Initializing strings, Accessing string elements, Array of strings, Passing strings to functions, String functions. | **08** |

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| **IV** | **Structure:** Introduction, Initializing, defining and declaring structure, Accessing members, Operations on individual members, Operations on structures, Structure within structure, Array of structure, Pointers to structure.<br>**Union:** Introduction, Declaring union, Usage of unions, Operations on union. Enumerated data types<br>**Storage classes**: Introduction, Types- automatic, register, static and external. | **08** |
| **V** | **Dynamic Memory Allocation**: Introduction, Library functions – malloc, calloc, realloc and free.<br>**File Handling:** Basics, File types, File operations, File pointer, File opening modes, File handling functions, File handling through command line argument, Record I/O in files.<br>**Graphics:** Introduction, Constant, Data types and global variables used in graphics, Library functions used in drawing, Drawing and filling images, GUI interaction within the program. | **08** |

**Suggested Readings:**


1. Kanetkar Y., "Let Us C", BPB Publications.
2. Hanly J. R. and Koffman E. B., "Problem Solving and Program Design in C", Pearson Education.
3. Schildt H., "C- The Complete Reference", Tata McGraw-Hill.
4. Goyal K. K. and Pandey H.M., "Trouble Free C", University Science Press
5. Gottfried B., "Schaum's Outlines- Programming in C", Tata McGraw-Hill Publications.
6. Kochan S.G., "Programming in C", Addison-Wesley.
7. Dey P. and Ghosh M., "Computer Fundamentals and Programming in C", Oxford University Press.
8. Goyal K. K., Sharma M. K. and Thapliyal M. P. "Concept of Computer and C Programming", University Science Press.

| BMC151 : PROBLEM SOLVING USING C LAB | | |
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| **Course Outcome (CO)** | | **Bloom's Knowledge Level (KL)** |
| **At the end of course, the student will be able to** | | |
| CO1 | Write, compile, debug and execute programs in a C programming environment. | $K_3$ |
| CO2 | Write programs that incorporate use of variables, operators and expressions along with data types. | $K_3$ |
| CO3 | Write programs for solving problems involving use of decision control structures and loops. | $K_3$ |
| CO4 | Write programs that involve the use of arrays, structures and user defined functions. | $K_3$ |
| CO5 | Write programs using graphics and file handling operations. | $K_3$ |

1. Program to implement conditional statements in C language.
2. Program to implement switch-case statement in C language
3. Program to implement looping constructs in C language.
4. Program to perform basic input-output operations in C language.
5. Program to implement user defined functions in C language.
6. Program to implement recursive functions in C language.
7. Program to implement one-dimensional arrays in C language.
8. Program to implement two-dimensional arrays in C language.
9. Program to perform various operations on two-dimensional arrays in C language.
10. Program to implement multi-dimensional arrays in C language.
11. Program to implement string manipulation functions in C language.
12. Program to implement structure in C language.
13. Program to implement union in C language.
14. Program to perform file handling operations in C language.
15. Program to perform graphical operations in C language.

**Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.**