C-DAC &Gujarat Technological University
M.E. Electronics & Communication Engineering
(VLSI & Embedded Systems Design)
Gandhinagar

Semester: I

Subject Name: Embedded C (Elective-I)

Subject Code: 2715205

Unit -I Fundamentals
History of C and overview of standards(K&R, ANSI, C99, C1x, gnu extensions etc.)
Development life cycle of a C program, GNU Tools required gcc, cpp, as, ld, nm,objdump etc.
Layout of C executable (code, data, bss,stack,heap etc) Debugging C Programs using gdb.Representation of integral, floating values(2's compliment,IEEE 32 bit,64 bit formats), Endianness Portability Issues, usage of Typedef, Register storage class, Volatile Variables

Unit -II Control Structures,Pointers, Arrays, Functions
Recap of control structures,Architecture dependent, independent optimizations
Concept of pointers, NULL Pointer,Pointer arithmetic, void pointer, pointer to pointer, pointer to array, array of pointers, pointers and const keyword.
Creation,Initialization of 1D,2D arrays, Accessing elements of 1D, 2D arrays using pointers as well as subscrip Oerators.

Unit -III Functions, Strings
Scope and Lifetime of variables, Storage classes, Internal vs External linkage, Symbol lookup using nm, Passing arguments by value, address, Return mechanism, Inline Functions, Recursion vs Iteration, Tail Recursion,Function pointers, Callback functions
String operations, library functions, implementing own logic,Table of strings(fixed length,variable length), Shallow vs Deep copy of strings,Command line arguments, Passing environment variables

Unit -IV Structures & Unions , Preprocessor
Symbolic constants, Macros, Conditional Compilations, Predefined Constants, Preprocessor operators, Structure Alignment,Packing Issues, Padding Bits, offset of members,Bit fields, Bit manipulations, Unions, Understanding memory layout of variables

Unit -V Dynamic Memory management & Assembly
Dynamic memory using malloc,calloc, realloc, free , allocating 1D,2D arrays(fixed length,variable length rows) Analysis of memory leaks and heap errors using valgrind
Inline assembly, Register allocation, Creation of static and dynamic libraries, Makefiles

Reference: Embedded C Programming & the Microchip PIC 1st Edition by Richard H. Barnett, Larry O' Cull/ Delmar Cengage Learning