GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 6th Semester
Branch: Information Technology
Subject Name: Compiler Design
Subject Code: 1360504

Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (I)	ESE(V)	
4	0	2	5	70	30	20	30	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1.	**Overview of the Compiler and its Structure:** Language processor, Applications of language processors, Definition-Structure-Working of compiler, the science of building compilers, Basic understanding of interpreter and assembler. Difference between interpreter and compiler. Compilation of source code into target language, Cousins of compiler, Types of compiler	3	15
2.	**Lexical Analysis:** The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens, Input, elementary scanner design and its implementation (Lex), Applying concepts of Finite Automata for recognition of tokens.	6	15
3.	**Syntax Analysis:** Understanding Parser and CFG (Context Free Grammars), Left Recursion and Left Factoring of grammar Top Down and Bottom up Parsing Algorithms, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes	12	25
4.	**Error Recovery** Error Detection & Recovery, Ad-Hoc and Systematic Methods	4	10
5.	**Intermediate-Code Generation:** Variants of Syntax Trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking, Syntax Directed Translation Mechanisms, Attributed Mechanisms And Attributed Definition.	5	10
6.	**Run-Time Environments:** Source Language Issues, Storage Organization. Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management,	4	10
7.	**Code Generation and Optimization:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Machine dependent optimization, Machine independent optimization Error detection of recovery	6	15

Suggested Specification table with Marks (Theory):70

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	25	20	10	05	00

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books
1. Compiler Tools Techniques - A.V.Aho, Ravi Sethi, J.D.Ullman, Addison Wesley
2. The Theory And Practice Of Compiler Writing - Trembley J.P. And Sorenson P.G. Mcgraw-Hill

Reference Books:

1. Modern Compiler Design - Dick Grune, Henri E. Bal, Jacob, Langendoen, WILEYIndia
2. Compiler Construction - Waite W.N. And Goos G., Springer Verlag
3. Compiler Construction-Principles And Practices - D.M.Dhamdhere, Mcmillian
4. Principles of Compiler Design, V. Raghavan, McGrawHill

Course Outcome:

After learning the course, the students should be able to:

Sr. No.	CO statement
CO-1	Understand the basic concepts; ability to apply automata theory and knowledge on formal languages.
CO-2	Ability to identify and select suitable parsing strategies for a compiler for various cases. Knowledge in alternative methods (top-down or bottom-up, etc).
CO-3	Understand backend of compiler: intermediate code, Code optimization Techniques and Error Recovery mechanisms
CO-4	Understand issues of run time environments