

University of Mumbai			
Class: T.E.	Branch : Computer Engineering	Semester : VI	
Subject : System Programming And Compiler Construction (Abbreviated as SPCC)			
Periods per Week(Each 60 Min)	Lecture	04	
	Practical	02	
	Tutorial	-----	
		Hours	Marks
Evaluation System	Theory	03	100
	Oral	--	25
	Term Work	--	25
	Total	03	150

Prerequisites: Programming Language (C/C++/ JAVA)

Objectives: This course is an introduction to design and implementation of various types of system software like assemblers, macros, loaders and linkers. The course also aims to give knowledge of the principal structure of a compiler and about the basic theories and methods used to implement the different parts of the compiler.

Module	Contents	Hours
1	System Software : Concept, introduction to various system programs such as assemblers, loaders , linkers ,macro processors, compilers, interpreters, operating systems, device drivers	02
2	Assemblers : Basic Assembler functions , Elements of Assembly language programming, Overview of the assembly process, Design of Single pass and multi pass assemblers. Examples: SPARC Assembler.	06
3	Macros & Macro processors: Macro definition and examples, Definitions and concept of parameterized macro, nested macros, conditional macro expansion, recursive macro. Design of simple macro processor	03
4	Loaders and Linkers – Basic loader functions, Linking and Relocation concept, Concept of linkage editors, dynamic linking loader	03
5	Compilers: Introduction to Compilers, Phases of a compiler, comparison of compilers and interpreters.	01
6	Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, Finite Automata, Designing a lexical analyzer generator, Pattern matching based on NFA's.	03
7.	Syntax Analysis: Role of Parser, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.	06
8	Syntax Directed Translation: Syntax directed definitions, construction of syntax tree, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed definitions	03
9	Run Time storage: Activation record, handling recursive calls, management of variable length blocks, garbage collection and compaction, storage allocation strategies.	04

10	Intermediate Code Generation: Intermediate languages: graphical representations, DAGs, Three address code, types of three address statements, syntax directed translation into three address code, implementation of three address statements	04
11	Code Generation : Semantic stacks, attributed translations, evaluation of expressions, control structures, and procedure calls.	04
12	Code Optimization : Machine dependent and machine independent code optimization, Sources of optimization.	04
13	Compiler-compilers : JAVA compiler environment, YACC compiler-compiler	02

Books

TEXT BOOKS

1. A.V. Aho, and J.D.Ullman: **Principles of compiler construction**, *Pearson Education*
2. A.V. Aho, R. Shethi and Ulman; **Compilers - Principles, Techniques and Tools** , *Pearson Education*
- 3 Leland Beck “ **System Software**” *Addison Wesley*
4. D. M. Dhamdhare; **Systems programming & Operating systems**, *Tata McGraw Hill*

REFERENCES

1. J.J Donovan: **Systems Programming**.
2. Dick Grune, Koen G.L, Henri Bal; **Modern Compiler Design**, *Wiley Publications*
3. Kenneth C. Loudon; **Compiler Construction, Principles and Practice**, *Cengage Learning*
4. John R. Levine; **Linkers and Loaders**, *Morgan Kaufman*

TERM WORK

1. Design and implementation of 2 pass assemblers for X86 machine.
2. Design and Implementation of Macro Processor
3. Design a Lexical Analyser for a language whose grammar is known.
4. Design and Implementation of simple Parser using Lex Yacc.
5. Implementation of code optimization techniques.
6. Generate target code for the code optimized , considering the target machine to be X86.
7. Study of Different Debugger Tools.

PRACTICAL & ORAL EXAMINATION

Practical and Oral examination is based on the entire syllabus and may not be restricted to the practical carried out in the practical examination.