

GUJARAT TECHNOLOGICAL UNIVERSITY

MASTER OF COMPUTER APPLICATION

SEMESTER: III

Subject Name: **System Software (SS)**

Subject Code: **630005**

Objective:

- To understand the relationship between system software and machine architecture.
- To understand the processing of an HLL program for execution on a computer system.
- To understand the process of scanning and parsing.
- To know the design and implementation of assemblers, macro processor, linker and compiler.
- To have an understanding of loader, system software tools.
- To understand and know the working of device drivers

Prerequisites:

Basic knowledge of computer architecture and C programming.

Contents:

Unit-1: Introduction to System Software and software tools (15%)

Language Processors:

- Introduction
- Language Processing Activities
- Fundamentals of Language Processing & Language Specification
- Language Processor Development Tools.

Data Structures for Language Processing:

- Search Data structures
- Allocation Data Structures.

Software Tools:

- Software Tools for Program Development
- Editors
- Debug Monitors
- Programming Environments
- User Interfaces.

Unit-2: Assemblers (15%)

Assemblers:

- Elements of Assembly Language Programming
- A Simple Assembly Scheme
- Pass Structure of Assemblers
- Design of a Two Pass Assembler
- A single pass Assembler for IBM PC.

Unit-3: Macro Processors

(15%)

Macros and Macro Processors:

- Macro Definition and Call
- Macro Expansion
- Nested Macro Calls
- Advanced Macro Facilities
- Design of a Macro Preprocessor.

Unit-4: Compilers and Interpreters

(30%)

Scanning and Parsing:

- Introduction to NFA and DFA
- Approaches of parsing
- Different types of parsing techniques namely
- Recursive decent parser
- LL(1) parser
- Operator precedence parser. (First and follow technique for generating a parse table is to be taught)

Compilers and Interpreters:

- Phases of the Compiler
- Aspects of compilation
- Memory allocation
- Compilation of expressions and control structures
- Code optimization
- Interpreters: Use and overview of interpreters
- Pure and impure interpreters.

Unit-5: Linkers and Loaders

(15%)

- Introduction to linkers
- Relocation and Linking Concepts
- Design of a Linker
- Self-Relocating Programs
- A Linker for MS-DOS
- Linking for Overlays
- Introduction to Loader

Unit-6: Device drivers

(10%)

- Design and anatomy of UNIX device driver: Types of device driver
- General design of UNIX character device driver
- General design of UNIX block device driver
- UNIX device driver installation.

Main Reference Book(s):

1. D. M. Dhamdhare, “Systems Programming and Operating Systems”, Second Revised Edition, Tata McGraw-Hill, 1999.
2. George Pajari, “Writing UNIX device drivers”, Pearson Education Asia.

Suggested Additional Reading:

1. Leland L. Beck, “System Software – An Introduction to Systems Programming”, 3rd Edition, Pearson Education Asia, 2000.
2. Santanu Chattopadhyay, “System Software”, Prentice-Hall India, 2007
3. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques, and Tools”, 2nd Edition, Pearson Education Asia
4. Kenneth C. Loudon, “Compiler Construction: Principles and Practice”, (Thomson/Cengage)

Chapter-wise coverage from main reference books:

Book 1: Chapters: 1, 2, 3, 4, 5, 6, 7, 8

Book 2: Chapters: 1, 2, 5, 13

Accomplishments of the student after completing the course:

- Ability to understand the execution process of HLL programs.
- Ability to understand the working of scanners and parsers.
- Ability to understand the basic design of various system software.
- Ability to implement various system software.
- Ability to design and implement efficient programs/applications.
- Ability to know the working of device drivers.