| Course code | Course Name | L-T-P Credits | Year of Introduction |
|---|---|---|---|
| **CS303** | **SYSTEM SOFTWARE** | **2-1-0-3** | **2016** |

| Prerequisite: Nil |
|---|

**Course Objectives**

- To make students understand the design concepts of various system software like Assembler, Linker, Loader and Macro pre-processor, Utility Programs such as Text Editor and Debugger.

**Syllabus**

Different types of System Software, SIC & SIC/XE Architecture and Programming, Basic Functions of Assembler, Assembler Design, Single pass and 2 Pass Assemblers and their Design, Linkers and Loaders, Absolute Loader and Relocating loader, Design of Linking Loader, Macro Processor and its design, Fundamentals of Text Editor Design, Operational Features of Debuggers

**Expected Outcome**

The Students will be able to

  i.   distinguish different software into different categories..

  ii.   design, analyze and implement one pass, two pass or multi pass assembler.

 iii.   design, analyze and implement loader and linker.

 iv.   design, analyze and implement macro processors.

  v.   critique the features of modern editing /debugging tools.

**Text book**

1. Leland L. Beck, System Software: An Introduction to Systems Programming, 3/E, Pearson Education Asia, 1997.

**References**

1. D.M. Dhamdhere, Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw Hill.
2. http://gcc.gnu.org/onlinedocs/gcc-2.95.3/cpp_1.html - The C Preprocessor
3. J Nithyashri, System Software, Second Edition, Tata McGraw Hill.
4. John J. Donovan, Systems Programming, Tata McGraw Hill Edition 1991.
5. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, Linux Device Drivers, Third Edition, O.Reilly Books
6. M. Beck, H. Bohme, M. Dziadzka, et al., Linux Kernel Internals, Second Edition, Addison Wesley Publications,
7. Peter Abel, IBM PC Assembly Language and Programming, Third Edition, Prentice Hall of India.
8. Writing UNIX device drivers - George Pajari – Addison Wesley Publications (Ebook : http://tocs.ulb.tu-darmstadt.de/197262074.pdf ).

| Course Plan | | | |
|---|---|---|---|
| **Module** | **Contents** | **Hours** | **End Sem Exam. Marks** |

| | | | |
|---|---|---|---|
| **I** | **_Introduction :_** <br> System Software Vs. Application Software, Different System Software– Assembler, Linker, Loader, Macro Processor, Text Editor, <br><br> Debugger, Device Driver, Compiler, Interpreter, Operating System(Basic Concepts only) | **2** | **15%** |
| | SIC & SIC/XE Architecture, Addressing modes, SIC & SIC/XE Instruction set, Assembler Directives and Programming. | **6** | |
| **II** | **_Assemblers_** <br> Basic Functions of Assembler. Assembler output format – Header, Text and End Records- Assembler data structures, Two pass assembler algorithm, Hand assembly of SIC/XE program, Machine dependent assembler features. | **6** | **15 %** |
| **FIRST INTERNAL EXAM** | | |
| **III** | **_Assembler design options:_** <br> Machine Independent assembler features – program blocks, Control sections, Assembler design options- Algorithm for Single Pass assembler, Multi pass assembler, Implementation example of MASM Assembler | **7** | **15 %** |
| **IV** | **_Linker and Loader_** <br> Basic Loader functions - Design of absolute loader, Simple bootstrap Loader, Machine dependent loader features- Relocation, Program Linking, Algorithm and data structures of two pass Linking Loader, Machine dependent loader features, Loader Design Options. | **7** | **15 %** |
| **SECOND INTERNAL EXAM** | | |
| **V** | **_Macro Preprocessor:-_** <br> Macro Instruction Definition and Expansion. One pass Macro processor Algorithm and data structures, Machine Independent Macro Processor Features, Macro processor design options | **7** | **20 %** |
| **VI** | **_Device drivers:_** <br> Anatomy of a device driver, Character and block device drivers, General design of device drivers | **2** | **20 %** |
| | **_Text Editors:_** <br> Overview of Editing, User Interface, Editor Structure. | **2** | |
| | **_Debuggers :-_** <br> Debugging Functions and Capabilities, Relationship with other parts of the system, Debugging Methods- By Induction, Deduction and Backtracking. | **4** | |
| **END SEMESTER EXAM** | | |

# Question Paper Pattern

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
   a. Total marks : 12
   b. *Four* questions each having *3* marks, uniformly covering modules I and II; All*four* questions have to be answered.
3. Part B
   a. Total marks : 18
   b. *Three* questionseach having *9* marks, uniformly covering modules I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts.
4. Part C
   a. Total marks : 12
   b. *Four* questions each having *3* marks, uniformly covering modules III and IV; All*four* questions have to be answered.
5. Part D
   a. Total marks : 18
   b. *Three* questions each having *9* marks, uniformly covering modules III and IV; *Two* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
   a. Total Marks: 40
   b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
   c. A question can have a maximum of three sub-parts.

7. There should be at least 60% analytical/numerical questions.