6. Software Engineering for students: A Programming Approach by Douglas Bell, Pearson publication.

**Assessment:**

**Internal:**
Assessment consists of two tests (T1 and T2) .The final marks should be the average of the two tests.

**End Semester Theory Examination:** guidelines for setting up the question paper.

1. Question paper will comprise of total six questions.
2. Question Number One should be compulsory.
3. All question carry equal marks.
4. Students can attempt any three from the remaining.
5. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3).

**In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

| Subject Code | Subject Name | Credits |
|---|---|---|
| **MCA103** | **Computer Organization and Architecture** | **04** |

| Subject Code | Subject Name | Teaching Scheme | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Pract | Tut | Theory | TW | Tut. | Total |
| **MCA103** | **Computer Organization & Architecture** | **04** | **--** | **--** | **04** | **--** | **--** | **04** |

| Subject Code | Subject Name | Examination Scheme | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **MCA 103** | **Computer Organization and Architecture** | Theory Marks | | | | TW | Pract | Oral | Total |
| | | Internal Assessment | | | End Semester Exam | | | | |
| | | Test1 (T1) | Test2 (T2) | Average of T1 & T2 | | | | | |
| | | 20 | 20 | 20 | 80 | - | - | - | 100 |

**Pre-requisites:**
Basic knowledge of Computer Fundamentals

**Course Educational Objectives (CEO):**

| | |
|---|---|
| **CEO1** | To have a understanding of Digital systems and operation of a digital computer. |
| **CEO2** | To learn different architectures & organizations of memory systems, processor organization and control unit. |
| **CEO3** | To understand the working principles of multiprocessor and parallel organization's as advanced computer architectures |

**Course Outcomes: At the end of the course, the students will be able to:**

| | |
|---|---|
| **MCA103.1** | Design trade-offs Basic fundamentals in digital logic & structure of a digital computer |
| **MCA103.2** | Identify performance issues in processor and memory design of a digital computer. |
| **MCA103.3** | To Develop independent learning skills and be able to learn more about different computer architectures and hardware. |
| **MCA103.4** | To articulate design issues in the development of Multiprocessor organization & architecture. |

**Syllabus**

| Sr. No. | Module | Detailed Contents | Hrs |
|---|---|---|---|
| **1** | **Fundamentals of Digital Logic** | Boolean Algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits : Adders, Mux, De-Mux, Sequential Circuits : Flip-Flops (SR, JK & D), Counters : synchronous and asynchronous Counter | **12** |
| **2** | **Computer System** | Comparison of Computer Organization &Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access | **06** |
| **3** | **Memory System Organization** | Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory : Magnetic Discs, Optical Memory, Flash Memories, RAID Levels | **08** |
| **4** | **Processor Organization** | Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU] , Processor Organization, Structure and Function. Register Organization, Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues. | **12** |
| **5** | **Control Unit** | Micro-Operations, Functional Requirements, Processor Control,<br>Hardwired Implementation, Micro-programmed Control | **04** |

| | | | |
|---|---|---|---|
| **6** | **Fundamentals of Advanced Computer Architecture** | Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers.<br>Multiprocessor Systems : Structure & Interconnection Networks,<br>Multi-Core Computers: Introduction, Organization and Performance. | **08** |
| **7** | **Case Study** | Case study : Pentium 4 processor Organization and Architecture | **02** |

**Reference Books:**


1. Modern Digital Electronics, R.P.Jain, 4e, Tata Mc Graw Hill.
2. Computer Organization & Architecture, William Stallings, 8e, Pearson Education.
3. Computer Architecture & Organization, John P. Hayes, 3e, Tata McGraw Hill.
4. Computer Organization, 5e, Carl Hamacher, Zconko Vranesic & Safwat Zaky, Tata McGraw Hill.
5. Digital Computer Fundamentals, Bartee C. Thomas , McGraw-Hill International Edition
6. Computer System Architecture, M. Morris Mano, Pearson Education.
7. Computer Architecture & Organization, Nicholas Carter, McGraw Hill.
8. Computer Architecture & Organization, 2e, Miles Murdocca & Vincent Heuring, Wiley India.


**Assessment:**

**Internal:**
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**End Semester Theory Examination:** Guidelines for setting up the question paper.

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