Computer Organization and Architecture

SWAYAM Prabha Course Code-KCS302

PROFESSOR'S NAME	Dr. Vivek S. Verma
DEPARTMENT	Information Technology
INSTITUTE	Ajay Kumar Garg Engineering College, Ghaziabad
COURSE OUTLINE	This course is intended to teach the basics of computer organization and the basic architecture concepts. This course will also expose students to the basic architecture of processing, performance analysis, instruction set design, pipelining concept, memory technology, memory mapping, virtual memory management, and I/O systems.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	Lecture 1	Introduction, Functional Units and their Basic Operations
2	Lecture 2	Bus Structure, types of buses and bus arbitration
3	Lecture 3	Register and Register Transfer
4	Lecture 4	Bus and Memory Transfer
5	Lecture 5	Processor Organization, General Register Organization
6	Lecture 6	Stack Organization
7	Lecture 7	Instruction Formats and Addressing Modes
8	Lecture 8	Module 1-Numerical Problems
9	Lecture 9	Arithmetic Circuit Design
10	Lecture 10	Logic and Shift Micro-operations
11	Lecture 11	Arithmetic and logic unit: Look ahead carry adder

12	Lecture 12	Array Multiplier, Booth Multiplication Algorithm
13	Lecture 13	Division Operations
14	Lecture 14	Floating point arithmetic operation, IEEE Standard for Floating Point Numbers
15	Lecture 15	Module 2-Numerical Problems
16	Lecture 16	Instruction Types and Instruction Formats
17	Lecture 17	Instruction cycle (fetch and execute etc.)
18	Lecture 18	Micro-operations, Execution of a Complete Instruction
19	Lecture 19	Program Control
20	Lecture 20	Pipelining concept
21	Lecture 21	Reduced Instruction Set Computer, Hardwired and Micro-programmed control
22	Lecture 22	Microprogram Sequencing, Horizontal and Vertical Microprogramming
23	Lecture 23	Module 3-Numerical Problems
24	Lecture 24	Basic concept of memory and memory Hierarchy
25	Lecture 25	Main Memory: RAM, ROM memories, and address mapping and CPU-interconnection, 2D & 2 1/2D memory organization
26	Lecture 26	Cache memories: concept and design issues & performance metrices
27	Lecture 27	Memory address mapping techniques and data block replacement
28	Lecture 28	Auxiliary memories: magnetic disk, magnetic tape and optical disks
29	Lecture 29	Virtual memory concept and its implementation
30	Lecture 30	Page replacement algorithms and memory managements hardware

31	Lecture 31	Module 4-Numerical Problems
32	Lecture 32	Input / Output: Peripheral devices, I/O interface,
33	Lecture 33	Asynchronous Data Transfer and Asynchronous Communication Interface
34	Lecture 34	Modes of Data Transfer: Programmed I/O, interrupt initiated I/O
35	Lecture 35	Interrupts: interrupt hardware, types of interrupts and exceptions
36	Lecture 36	Direct Memory Access (DMA) and I/O channels and processors
37	Lecture 37	Serial Communication: Synchronous & asynchronous communication and Standard communication interfaces

References:

1. Computer System Architecture - M. Morris Mano, Pearson Education, Fourth Edition, Reprint-2007.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012.
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998.
4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh Edition, 2006.
5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Edition, 2011.

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