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| **SESSION** | **APRIL 2025** |
| **PROGRAM** | **MASTER OF COMPUTER APPLICATIONS (MCA)** |
| **SEMESTER** | **II** |
| **COURSE CODE & NAME** | **DCA6210 COMPUTER ARCHITECTURE** |
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**Set-I**

**Q1. What Is Meant by Direct Mapping? Discuss the Various Types of Mapping**

**Ans 1.**

**Cache Memory and Mapping Techniques**

In computer architecture, cache memory is a small, high-speed memory unit located between the CPU and main memory. It stores frequently accessed data to reduce memory access time. Since the cache is limited in size, it cannot store the entire main memory. Hence, a mapping technique is required to decide which memory block should be placed in which cache location.

**Understanding Direct Mapping**

**Direct mapping** is one of the simplest and fastest cache mapping techniques. In direct mapping,

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**Q2. What are addressing modes? Explain various addressing modes with example. 2+8**

**Ans 2.**

**Addressing Modes in Computer Architecture**

Addressing modes are techniques used in computer instructions to specify operands. In simple terms, addressing modes define how the effective address of the operand is calculated during instruction execution. These modes offer flexibility and help programmers write efficient and optimized code by accessing operands in different ways.

**Immediate Addressing Mode**

In this mode, the operand is directly specified within the instruction itself. No memory access is

**Q3. What Are Pipelining Hazards? Explain Various Hazards in Detail**

**Ans 3.**

**Pipelining in CPUs**

Pipelining is a technique used in modern CPUs to increase instruction throughput by overlapping the execution of multiple instructions. A pipeline divides instruction execution into multiple stages such as fetch, decode, execute, and write-back. While this improves performance, it also introduces challenges known as pipelining hazards that can reduce efficiency.

**Pipelining Hazards**

Pipelining hazards are conditions that prevent the next instruction in the pipeline from executing

Set-II

**4. What is Amdahl's Law, and how does it relate to multicore systems? 10**

**Ans 4.**

**Amdahl’s Law**

Amdahl’s Law is a formula used to find the maximum improvement in performance a system can achieve when only part of the system is enhanced or parallelized. Introduced by Gene Amdahl in 1967, the law provides insight into the theoretical speedup of a program when some portion of the code is parallelized while the remaining portion remains sequential.

**Understanding Amdahl’s Law**

Amdahl’s Law is expressed mathematically as:

**Q5. Describe in brief the architecture of vector processor. What are some of the key limitations of this architecture? 8+2**

**Ans 5.**

**Vector Processor Architecture**

A vector processor is a type of CPU designed to perform mathematical operations on entire arrays or vectors of data with a single instruction. Unlike scalar processors that operate on single data elements, vector processors exploit data-level parallelism by applying the same operation across multiple data points simultaneously. These processors are widely used in scientific computations, simulations, and multimedia applications.

**Working of Vector Processors**

In a vector processor, operations are executed on vectors stored in vector registers. A single

**Q6. What is the difference between SMP and AMP in multiprocessor systems 5+5**

**Ans 6.**

**Multiprocessor Systems**

Multiprocessor systems consist of two or more CPUs that share a common memory and work together to execute programs. These systems are designed to enhance performance, improve fault tolerance, and increase processing capability. There are two primary types of multiprocessor