# IDATA2305 Operating Systems with System Programming

## This document includes questions and answers for the IDATA2305 course, covering topics that may appear in exams.

## Chapter 1 - Introduction

**Why is an Operating system required? What are its functions?**

Answer here

**How does a device controller inform the CPU that it has finished its operation?**

Answer here

**How does the CPU move its data regarding local buffers?**

Answer here

**The program must be in which memory to be executed directly by the CPU?**

Answer here

**Why does the CPU execute data from main memory and not secondary storage?**

Answer here

**What is an interrupt request?**

Answer here

**Describe all these terms with an example for each.**

***Interrupt handling routine***

Answer here

***Application program***

Answer here

***System program***

Answer here

***Kernel***

Answer here

Example: The Linux kernel.

***Operating system***

Answer here

**What is the term for the communication channels through which the CPU and Input/Output (I/O) device controllers exchange data?**

Answer here

**What are input and output devices?**

Answer here

**Are monitors and printers input devices or output devices?**

Answer here

**Is a webcam an input device or output device?**

Answer here

**Why is caching memory advantageous (Mention three points)? Where is it located?**

Answer here

**Identify volatile and non-volatile memory? Also, which memory is the slowest?**

Answer here

a) Magnetic tape: Answer here

b) Random Access Memory: Answer here

**A java code expects values less than 10 to be entered by the end user. A user enters 12 as input. What is this error in operating system terminology? Is the error software generated or hardware generated?**

Answer here

**Why do we need a multitasking operating system? How does it work?**

Answer here

**What is the difference between process management and memory management?**

Answer here

## Chapter 2 – OS internals

**What are some OS interfaces, and how do they work?**

Answer here

**What is Standard API?**

Answer here

**What is API – System Call – OS Relationship?**  
Answer here

**Name all six types of System Calls**Answer here

**What are Linkers and Loaders?**  
Answer here

## Chapter 3 – Threads and Concurrency

**Identify the basic components of a thread.**

Answer here

**What is the difference between threads and processes?**Answer here

**Describe the 4 main benefits and challenges of designing multithreaded applications**

Answer here

## Chapter 4 – Thread Synchronization

**What are Race Conditions in threads?**Answer here

**How can we prevent Race Conditions?**Answer here

**What is Thread Starvation?**  
Answer here

## Chapter 5 – CPU Scheduling

**Why is CPU Scheduling so important?**  
Answer here

**How does multiprogramming contribute to maximizing CPU utilization, and what are the key aspects of the CPU-I/O burst cycle in process execution?**Answer here

**What is Preemtive and non-Preemtive scheduling?**

Answer here

**Explain the terms regarding Scheduling Criteria**

Answer here

**Explain the main CPU scheduling algorithms**  
Answer here

## Chapter 6 – Deadlocks

**Define the four necessary conditions that characterize deadlock.**

Answer here

**What is a Resource-Allocation Graph (RAG)?**Answer here

**Does cycles always lead to deadlock?**  
Answer here

**How can we prevent deadlocks?**Answer here

**What is Banker’s algorithm?**Answer here

**How can we recover from deadlocks?**Answer here

## Chapter 7 – Memory Management

**What are some various ways to manage memory?**

Answer here

**Mention the most common memory management algorithms.**

Answer here

**What are some Paging strategies?**

Answer here

**Shortly explain Basic memory hardware**

Answer here

**What is logical and physical address spaces?**

Answer here

**What is Memory-Management Unit (MMU)?**

Answer here

**What is contiguous and non-contiguous memory?**

Answer here

**What is External and Internal Fragmentation? Mention Solutions aswell**

Answer here

## Chapter 8 – Virtual Memory Management

**What is Virtual Memory and why do we need it?**

Answer here

**What is Demand Paging?**

Answer here

**What is a Page Fault and how can we handle one?**

Answer here

**What is Over-Allocation and High Access Time?**

Answer here

**What is Page Replacement?**

Answer here

**Mention the most common Page Replacement algorithms**

Answer here

## Chapter 9 – Secondary Memory Management

**What is Mass-Storage Structure?**

Answer here

**What are Magnetic Disks?**

Answer here

**What is a Head Crash?**

Answer here

**What is Constant Linear Velocity (CLV)?**

Answer here

**Explain how Disk Scheduling works.**

Answer here

**Mention the six most common Disk Scheduling Algorithms**

Answer here

## Chapter 10 – File Systems

**What is a File System and why do we use it?**

Answer here

**Mention some File Systems**

Answer here

**What are the general file attributes?**

Answer here

**Why do we use Path names?**

Answer here

**What are hard and soft links?**

Answer here

**Mention some file sharing techniques.**

Answer here