What is an operating system and what are the general main goals of an operating system alongside with its different roles? Think about two different operating systems that you know of and discuss their differences in terms of their priority goals. [8]

What are the main four components of a computer system and what is the connection between them? Please provide a schema that demonstrates this. [6]

Explain in an operational schema how the CPU connects to the other components of a computer system. What are these components and its usefulness? [8]

Explain what DMA is and what the steps are that a DMAC will have to take in order to access the main memory. [6]

Describe all the existing types of storage and discuss the differences between them. [8]

What are the differences between a Multiprocessor and a Multicore system? [5]

What are the advantages of asymmetric clustering **systems** in comparison with symmetric clustering? [4]

Describe and compare the different types of computing environments that have been mentioned in the course. [6]

What is a system call and what is its purpose? [4]

Explain how a stack works and give a functional schema. [4]

What are the different process states that exist; please provide a diagram? [5]

Describe the procedure of process creation and give an example of a process tree. [5]

Explain what an IPC is and describe its two models. [6]

What is the difference between direct and indirect communication? [3]

Give a representation of Process scheduling and explain. [5]

What is a scheduler and a dispatcher? [4]

Demonstrate how context switching works. [4]

Discuss the terms non-pre-emptive and non-preemptive. (4 marks)

What are the main scheduling criteria? [4]

Given the details below, calculate the waiting, turnaround and their average time for every algorithm asked plus their Gantt chart demonstrating the process scheduling procedure: FCFS, SJF, SRTF, RR, and Priority. In the end discuss your findings and compare your results. Assuming Q=5 and that context switching might take some time. [20]

Which algorithms can lead to starvation? Please discuss. [5]

Discuss what is SRAM and DRAM and explain their differences and how they are used in an operating system. [5]

Define what a cache is and how the caching procedure takes place. [5]

Describe the procedure of Address Binding with its three stages. [5]

Compare the Logical and the Physical Address space. [3]

Describe what linking is and explain its two different types. [4]

Give a simplified schema of a paging example. [5]

Explain what an offset is and calculate how many bits of offset will be needed for a 6K page and why. [5]

Describe and give a representation of how shared pages can work. Mention anything noticeable with this technique. [6]

Describe all steps of demand paging. [5]

Show in a schema how a page fault can be handled. [5]

Explain the benefits of page replacement and make a simple representation of how page replacement works. [6]

Describe the NRU technique and the second chance page replacement. Demonstrate how these techniques can be implemented. [6]

Explain what is needed to open a file and the file attributes that exist. [4]

Describe and explain the different types of access for files. [5]

Compare the single, two level and tree structures directories (all different kinds). [8]

How can we deal with file sharing in terms of security? Mention type of failures on file sharing. [4]

Describe the layered file system schema. [6]

What information does an FCB contain? (3 marks)

Compare the different allocation mechanisms and give schemas regarding their application. [6]

What is the difference between a Unified and Non-unified cache? [5]

Mention all the differences that you know (other differences, design etc.) between Unix like systems and MS-DOS. What are the main differences in process, scheduling, memory, file management. [10]

What are inodes and how are important? [6]

Describe Inter-process Communication (IPC) in Unix and MS-DOS. [4]

Definition of buffer pool, pipes [3]

Definition of following terms: VFS, contiguous, linked indexed allocation, FAT, free space management, log structured file system and recovery in file systems. [8]

Mention and describe all the different types of page tables. [8]

Explain the following terms: TLB, hit ratio, demand paging, page fault, COW, page replacement, priority frame allocation, NUMA, global and local allocation, thrashing. [10]

Explain the following terms: Contiguous allocation, storage allocation types, fragmentation, segmentation, and paging. [7]

Give definitions for the following terms: Synchronization, buffering and socket, dispatch latency, multi-level queue scheduling algorithm and multi-level feedback queue scheduling algorithm. [7]

Give the definitions of the following terms and make a comparison discussion: Multiprogramming, Multitasking, Multiprocessing and Multithreading. [5]