Faculty of Science
Mathematics Department
Date : 2025/3/27
Number of pages : 3

Course :COMP 305
Level 4 - Semester : 1
Program: Computer Science
Time: 2 hours
Total Marks: 100 Marks

Operating Systems

Answer all the following questions

Question 1) [5 Marks]

1.1 Explain the difference between processes and threads

1.2 When would you use multithreading vs multiprocessing?

Question 2) [5 Marks]

2.1 Describe how virtual memory works

2.2 What is the purpose of a page table?

Question 3) [5 Marks]

3.1 Explain the four necessary conditions for deadlock

3.2 How does the Banker's Algorithm prevent deadlocks?

Question 4) [5 Marks]

4.1 Compare FCFS and Round Robin scheduling

4.2 What is convoy effect in CPU scheduling?

Question 5) [5 Marks]

5.1 What is a race condition?

5.2 How do semaphores solve synchronization problems?

Question 6) [5 Marks]

6.1 Explain demand paging

6.2 What is the working set model?

Question 7) [5 Marks]

7.1 Describe the structure of a UNIX inode

7.2 What are hard links vs symbolic links?

Question 8) [5 Marks]

8.1 What is a system call?

8.2 Give examples of process control system calls

Question 9) [5 Marks]

9.1 Explain the concept of thrashing

9.2 How does the operating system detect thrashing?

Question 10) [5 Marks]

10.1 What is a zombie process?

10.2 How does the operating system handle orphan processes?

Question 11) [5 Marks]

11.1 Describe the readers-writers problem

11.2 Provide a solution using semaphores

Question 12) [5 Marks]

12.1 What is disk formatting?

12.2 Explain low-level vs high-level formatting

Question 13) [5 Marks]

13.1 Describe the dining philosophers problem

13.2 What are the solutions to prevent deadlock in this scenario?

Question 14) [5 Marks]

14.1 What is a monolithic kernel?

14.2 Compare with microkernel architecture

Question 15) [5 Marks]

15.1 Explain memory-mapped files

15.2 What are their advantages?

Question 16) [5 Marks]

16.1 What is swap space?

16.2 How does the OS manage it?

Question 17) [5 Marks]

17.1 Describe the producer-consumer problem

17.2 Provide a solution using monitors

Question 18) [5 Marks]

18.1 What is RAID?

18.2 Compare different RAID levels

Question 19) [5 Marks]

19.1 Explain the concept of interrupts

19.2 What is the difference between traps and interrupts?

Question 20) [5 Marks]

20.1 What is a real-time operating system?

20.2 Compare hard vs soft real-time systems