

BCA/OSM : 301 (O)



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(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : OSM : 301 (Old Course)

(Operating System)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

The questions are of equal value

- 1. Describe the structure of an operating system and explain the role of its main components in managing computer resources.**

Or

Discuss the concept and implementation of virtual machines in operating systems.

- 2. Explain the Round-Robin scheduling algorithm with an example.**

Or

Explain the three multithreading models with diagrams.

3. Explain paging and segmentation schemes in memory management. How do they differ in terms of implementation and performance?

Or

Discuss FIFO page replacement and optimal page replacement algorithms.

4. Define deadlocks. Discuss the conditions necessary for deadlock occurrence and explain in detail the approaches of deadlock recovery.

Or

Explain the concept of semaphores. Illustrate their use in solving the readers-writers problem.

5. Explain the role of file protection mechanisms in operating systems. Discuss how access control is implemented to ensure security in file systems.

Or

Explain directory implementation techniques (linear list and hash table). Also discuss file system mounting.

★★★

2025

(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : OSM : 301 (Old Course)

(Operating System)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

- A.** Choose the most appropriate answer from the given options by putting a Tick (✓) mark in the brackets provided : 1×10=10

1. System calls act as

- (a) hardware interrupts ()
- (b) interface between user and kernel ()
- (c) link between compiler and loader ()
- (d) communication between processes ()

2. Which of the following is a disadvantage of the layered approach to operating system design?

(a) It may cause performance over-head because each layer adds processing time ()

(b) It requires careful definition of layers, which can complicate system design ()

(c) It can limit the flexibility of interactions between system components ()

(d) It may increase memory usage due to duplication of functionality across layers ()

3. When a parent process is terminated, the operating system may also terminate all of its child processes. This is known as

(a) Cooperative termination ()

(b) Non-preemptive termination ()

(c) Hierarchical termination ()

(d) Cascading termination ()

4. Context switching occurs when

(a) a process voluntarily releases the CPU ()

(b) a program moves from main memory to secondary storage ()

(c) the CPU switches from one process to another ()

(d) an interrupt is disabled ()

5. In paging, the logical address is divided into

- (a) page number + offset ()
- (b) segment number + offset ()
- (c) frame number + offset ()
- (d) block number + offset ()

6. Thrashing occurs when

- (a) too many processes are suspended ()
- (b) CPU utilization is high ()
- (c) processes spend more time in paging than execution ()
- (d) page size is too large ()

7. The readers-writers problem mainly deals with

- (a) reader starvation ()
- (b) memory fragmentation ()
- (c) file protection ()
- (d) disk scheduling ()

8. Which of the following is not a necessary condition for deadlock?

- (a) Mutual exclusion ()
- (b) Hold and wait ()
- (c) Circular wait ()
- (d) Preemption ()

9. In file system implementation, allocation methods decide

- (a) how files are named ()
- (b) how free space is linked to directories ()
- (c) how disk blocks are assigned to files ()
- (d) how users are authenticated ()

10. Which of the following best defines file sharing in operating systems?

- (a) Storing multiple copies of the same file ()
- (b) Allowing multiple users or processes to access the same file ()
- (c) Using hashing for file lookups ()
- (d) Using paging to access file data ()

B. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark : 1×5=5

1. Precedence graphs are used to solve the critical section problem in process synchronisation.

(T / F)

2. In operating systems, directories are used to organise and manage files.

(T / F)

3. Virtual memory allows execution of processes that may not be completely in main memory.

(T / F)

4. In message-passing systems with zero capacity, a queue of size one is maintained to store messages until the receiver is ready.

(T / F)

5. The bootstrap program is responsible for loading the operating system kernel into memory at startup.

(T / F)

C. Answer the following questions in short : $2 \times 5 = 10$

1. Briefly explain any two methods to deadlock handling.

2. What are the two main access methods used in file systems?

3. Name four pieces of information that the process control block (PCB) contains.

4. Differentiate between a system call and a system program.

5. State one difference between paging and segmentation.
