K–996

MCS–504/MIT(CS)–304

MCA/MSCIT/MSCCS Ist/IIIrd Semester Examination Dec., 2023

OPERATING SYSTEM/INTRODUCTION TO OPERATING SYSTEM

Time : 2 Hours]   [**Max. Marks :** 70

Note **:–** This paper is of Seventy (70) marks divided into two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given there in. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

Section–A

(Long Answer Type Questions)   2×19=38

Note **:–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Compare and contrast different types of operating systems, including batch processing, time-sharing, real-time, and distributed systems. Discuss their characteristics, advantages, and disadvantages.

2. Discuss different file organization methods, such as sequential, indexed, and direct access. Compare their advantages and disadvantages, and provide examples of scenarios where each type is most suitable.

3. Discuss the need for interprocess communication in operating systems. Explore different mechanisms for IPC, such as shared memory, message passing, and semaphores. Provide examples of scenarios where each IPC mechanism is appropriate.

4. Explain the concept of Interrupts. How interrupt handled using device drivers.

5. Explain the architecture of a Unix operating system. Discuss the role of the kernel, shell, and file system. Explore how processes are managed and communicate in a Unix environment.

K–996

Section–B

(Short Answer Type Questions) 4×8=32

Note :– Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Define virtual memory and its role in modern operating systems. Discuss the benefits of virtual memory.

2. Provide an in-depth explanation of Direct Memory Access (DMA) and its role in improving I/O efficiency.

3. Briefly discuss about the file permissions of Unix.

4. Given the following information for a system :

Process	Max (A, B, C)	Allocation (A, B, C)	Available (A, B, C)
P1	7,5,3	0,1,0	3,3,2
P2	3,2,2	2,0,0	
P3	9, 0, 2	3,0,2	
P4	2, 2, 2	2,1,1	

Apply the Banker's algorithm to determine if the system is in a safe state after the request (1, 0, 2) by process P2.

K–996 (3) P.T.O.

5. In a demand-paging system using the Least Recently Used (LRU) page replacement policy, if a process references pages in the following order: 1, 2, 3, 4, 1, 2, 5, 1, 2, calculate the number of page faults using a page frame size of 3.

6. Given the quantum time of 4 units and the burst times of processes :

Process	Burst Time	Arrival Time
P1	12	0
P2	6	3
P3	8	4
P4	10	5

Calculate the average turnaround time and waiting time using the SJF and Round Robin scheduling algorithm.

7. What are the synchronization issues that can arise when multiple processes access shared memory, and how can they be addressed ?

8. Discuss and differentiate between Windows and Unix operating system.

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K–996   (4)