(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

FIRST SEMESTER (MCA) DECEMBER-2023 – JANUARY 2024

Paper Code: MCA-105 ***Subject: Operating System with Linux***

Time: 3 Hours ***Maximum Marks: 60***

Note: Attempt five questions in all including Q.no.1 which is compulsory. Select one question from each unit.

Q1. Answer the following briefly: **(2x10 = 20)**

(a) Compare monolithic kernel and microkernel. Which type of kernel is used in Microsoft Windows 10?

(b) Differentiate between internal and external command in Linux.

(c) Illustrate the bootstrap process of an operating system.

(d) Differentiate between busy waiting and blocked waiting in an operating system.

(e) Write the Peterson's algorithm (pseudo code) to solve critical-section problem.

(f) Compare internal fragmentation with external fragmentation of memory.

(g) Explain the necessary and sufficient conditions for a deadlock situation in the computer system.

(h) Differentiate between physical and logical formatting of a disk.

(i) Explain blocking and non-blocking I/O.

(j) Describe the concept of data mirroring in RAID.

UNIT - I

Q2. (a) What is distributed operating system? Compare client–server computing and peer–to–peer computing. **(5)**

(b) Explain the multi-programmed batch systems and time-sharing systems with their advantages and disadvantages. **(5)**

OR

Q3. (a) Why inter-process communication is important? Compare shared memory and message passing models of inter-process communication. **(5)**

(b) What is interrupt? Explain various services offered by an operating system. **(5)**

UNIT - II

Q4. (a) Describe the functions of a dispatcher. Illustrate multilevel queue scheduling approach. **(5)**

(b) Explain the readers–writers problem. Write algorithm (code snippet) to solve the readers–writers problem using Semaphore. **(5)**

OR

Q5. (a) What are the conditions to be fulfilled by a solution of critical-section problem? Explain the TestAndSet() and Swap() approaches to solve the critical section problem. **(5)**

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P.T.O.

(b) What is the use of medium-term scheduler? Three processes P1, P2 and P3 arrive at time zero. Their total execution time is 10ms, 15ms, and 20ms, respectively. They spent first 20% of their execution time in doing I/O, next 60% in CPU processing and the last 20% again doing I/O. Using round robin algorithm, determine the utilization of CPU in percentage. **(5)**

UNIT - III

Q6. (a) Differentiate between deadlock and starvation. By considering an appropriate example, describe the process initiation denial approach of deadlock avoidance. **(5)**

(b) Explain demand paging with its advantages and disadvantages. Illustrate the page fault handling process with a suitable diagram. **(5)**

OR

Q7. (a) Describe resource allocation graph approach for deadlock detection. With a suitable example, justify that a cycle in the graph is a necessary but not a sufficient condition for the existence of deadlock. **(5)**

(b) Explain the Belady's anomaly in page-replacement algorithms? Consider the page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 with 4 page frames, determine the number of page faults using LRU and FIFO page replacement algorithm. **(5)**

UNIT – IV

Q8. (a) Differentiate between the Scan and C-Scan disk-scheduling algorithms. A disk queue requests for I/O to blocks on cylinders 98, 183, 37, 122, 14, 124, 65, and 67, determine the total head movement (in cylinders) if the disk head is initially at cylinder 53 and the disk arm is moving toward 0. **(5)**

(b) Explain the linked-allocation and indexed-allocation methods of allocating disk space, with their advantages and disadvantages. **(5)**

OR

Q9. (a) Explain the use (with syntax in 'C' programming) of following file management system calls of Linux: (a) access, (b) chmod, (c) umask, (d) open, and (e) creat. **(5)**

(b) Explain various approaches of free disk-space management in operating systems. **(5)**

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