(An Autonomous Institute Affiliated to AKTU, Lucknow) MCA **SEM: I - THEORY EXAMINATION (2024-2025) Subject: Operating Systems Time: 3 Hours** Max. Marks: 100 **General Instructions: IMP:** *Verify that you have received the question paper with the correct course, code, branch etc.* 1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice *Questions (MCQ's) & Subjective type questions.* 2. Maximum marks for each question are indicated on right -hand side of each question. 3. Illustrate your answers with neat sketches wherever necessary. 4. Assume suitable data if necessary. 5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

1. Attempt all parts:-

- 1-a. What is the meaning of Booting in the operating system? CO1 K2
 - **Restarting computer** (a)
 - (b) Install the program
 - (c) To scan
 - (d) To turn off
- In multiprogramming environment, the OS decides which process gets the 1-b. processor when and for how much time. This function is called_ CO1 K2
 - process scheduling (a)
 - process rescheduling (b)
 - (c) traffic controller
 - (d) Processor Management
- Which of the following is true for Mutual Exclusion. CO2 K2 1-c.
 - No process accesses and manipulates the data at the sam etime. (a)
 - If process P1 is executing critical section, then no other process can access critical (b) section
 - Several processes access and manipulate data concurrently (c)
 - None of the above (d)
- Semaphore is a/an _____ to solve the critical section problem. CO 2 K2 1-d.

Printed Page:-04

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Subject Code:- BMCA0103Z

- (a) hardware for a system
- (b) special program for a system
- (c) integer variable
- (d) none of the mentioned
- 1-e. Which algorithm chooses the page that has not been used for the longest period of 1 time whenever the page required to be replaced? CO 3 K2

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- (a) least recently used algorithm
- (b) first in first out algorithm
- (c) Optimal algorithm
- (d) none of the mentioned
- 1-f. The first fit, best fit and worst fit are strategies to select a CO 3 K2
 - (a) process from a queue to put in memory
 - (b) processor to run the next process
 - (c) free hole from a set of available holes
 - (d) all of the mentioned

1-g. The Linux command ______ is used to print the working directory.CO4 K2 1

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- (a) print
- (b) pwd
- (c) pd
- (d) ps

1-h. Which command is used to display the contents of a file? CO 4 K2

- (a) show
- (b) display
- (c) print
- (d) cat
- 1-i. Which of the following is not a type of shell? CO 5 K2
 - (a) The C Shell
 - (b) The Korn Shell
 - (c) The Bourne Shell
 - (d) The Perl Shell
- 1-j. The shell script is CO 5 K2
 - (a) File containing a series of commands
 - (b) File containing special symbols
 - (c) group of commands
 - (d) group of functions
- 2. Attempt all parts:-
- 2.a. Define GUI and CLI with examples. CO 1 K2
- 2.b. Define Remainder Section. CO 2 K2

2.c.	Define page hit and page fault? CO 3 K2			
2.d.	Elaborate all three file permission in Linux. CO 4 K2			
2.e.	Define Shell Variable. CO 5 K2			
<u>SECTIO</u>	<u>N-B</u>	30		
3. Answe	er any <u>five</u> of the following:-			
3-a.	Explain why Scheduling is necessary. Discuss the five different scheduling criteria used in computing scheduling mechanism. CO 1 K2			
3-b.	Differentiate between system software and application software with example. CO 1 K2			
3-с.	Discuss the advantages and disadvantages of concurrency with suitable example. CO 2 K2			
3-d.	Write Short note on:- (i) Critical Section problem (ii) Race Condition CO 2 K2			
3.e.	Explain the concept of demand paging and the performance issues of demand paging? CO 3 K2			
3.f.	Decsribe the cut command in detail with examples. CO 4 K4			
3.g.	Explain how a FOR LOOP construct is used in shell script. Elaborate with example. CO 5 K4			
<u>SECTION-C</u>				
4. Answer any <u>one</u> of the following:-				
4-a.	Explain the following types of operating system (a)Multiprocessing10(b)Multitasking (c)Batch Processing (d)Multithreading (e)Distributed CO 1 K2			
4-b.	Explain the concept of 'process'. Also describe the contents of a process control 10 block(PCB) in details. CO 1 K2			
5. Answe	er any <u>one</u> of the following:-			
5-a.	Explain the need and use of critical section with the help of an example. CO 2 K2			
5-b.	Read the instructions carefully and answer the following questions. As per figure CO 2 K3	10		

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In this example, we have a process table with number of processes that contains allocation field (for showing the number of resources of type: A, B and C allocated to each process in the table), max field (for showing the maximum number of resources of type: A, B, and C that can be allocated to each process) and also, the available field (for showing the currently available resources of each type in the table).

Processes	Allocation	Max	Available
	ABC	ABC	АВС
PO	112	544	321
P1	212	433	
P2	301	913	
Р3	020	864	
Р4	112	223	

Considering the above processing table, we need to calculate the following two things:

1) Calculate the need matrix?

2) Is the system in a safe state?

6. Answer any one of the following:-

- 6-a. Explain about the following page replacement algorithms with their advantages 10 and disadvantages a)FIFO b)Optical Page Replacement , c) LRU CO 3 K2
- 6-b. Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 10 122, 14, 124, 65, 67. Assume Shortest Seek Time First disk scheduling algorithm is used. The head is initially at cylinder number 53 moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. Compute the total head movement (in number of cylinders) incurred while servicing these requests? CO 3 K3

7. Answer any one of the following:-

- 7-a. Explain the cat command in Linux with all its options in detail. Elaborate with 10 examples. CO 4 K 4
- 7-b. Explain with all options the use of chmod command. Support your answer with 10

examples. CO 4 K4

8. Answer any one of the following:-

- 8-a. Discuss the relational operators that are used in Linux with examples. CO 5 K4 10
- 8-b. Write a shell script to add two numbers taken from keyboard and display their 10 average. CO 5 K5

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