Printed Page:-04 Subject Code:- AMICA0301 Roll. No: NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow) MCA Int. SEM: III - 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. 20 **SECTION-A** 1. Attempt all parts:-1-a. Under which category Round-Robin scheduling falls ?(CO1, 1 Preemptive scheduling (a) Nonpreemptive scheduling (b) (c) All of the mentioned None of the mentioned (d) 1-b. A command interpreter is also known as?(CO1,K1) 1 prompt (a) Kernel (b) (c) Shell (d) Command 1-c. The code that changes the value of the semaphore is _____(CO2,K2) 1 remainder section code (a) Critical Section code (b) (c) Exit Section Code (d) None of the above The wait-for graph is a deadlock detection algorithm that is applicable when 1-d. 1 (CO2, K2) (a) all resources have a single instance all resources have multiple instances (b)

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- (c) all resources have a single 7 multiple instances
- (d) all of the mentioned

1-e. The first fit, best fit and worst fit are strategies to select a(CO3, 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-f. State true of false. i) With paging, each process is divided into relatively small, 1 fixed-size pages.ii) Segmentation provides for the use of pieces of varying size.(CO3,K2)

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- (a) True, False
- (b) True, True
- (c) False, True
- (d) False, False

1-g. Which among the following interacts directly with system hardware?(CO4, K2) 1

- (a) Shell
- (b) Commands
- (c) Kernel
- (d) Applications

1-h. Which command is used to remove an empty directory? (CO4, K1)

- (a) rmdir
- (b) remove
- (c) del
- (d) delete

1-i. To run the script, we should make it executable first by using ____(CO5, K1) 1

- (a) chmod + x
- (b) chmod +r
- (c) chmod + w
- (d) chmod +rwx

1-j. which extension is used to save the shell script___(CO5, K1)

- (a) .sh
- (b) .ps
- (c) .bs
- (d) .ls

2. Attempt all parts:-

2.a. Define Process Control Block and its parameters. (CO1, K2)

2.b. Discuss the role of process synchronization in avoiding the race condition.(CO2, 2 K2)

2.c.	Discuss the advantages and disadvantages of using C SCAN disk scheduling Algorithm. (CO3, K4)	2
2.d.	Differentiate windows and Linux operating system.(CO4, K2)	2
2.e.	How many types of control instructions are available in a shell? (CO5, K2)	2
SECTIO	<u>N-B</u>	30
3. Answe	er any <u>five</u> of the following:-	
3-a.	Compare multi-tasking operating system with multi-programming system. (CO1, K2)	6
3-b.	Difference between Non Preemptive priority scheduling and Preemptive priority scheduling with suitable example(CO1,K2)	6
3-с.	Discuss deadlock avoidance and deadlock prevention.(CO2, K2)	6
3-d.	Explain Resource allocation graph. Discuss single instance and multi instance RAG suitable example.(CO2,K2)	6
3.e.	Explain LOOK Disk Scheduling Algorithm with example.(CO3,K2)	6
3.f.	Describe any six Linux commands with examples.(CO4, K2)	6
3.g.	Write shell script to covert contents of multiple files from lower case to upper case. (CO5, K3)	6
SECTIO	<u>N-C</u>	50
4. Allswe	Describe the goal functions and characteristics of operating system in	10
4-a.	detail.(CO1, K2)	10
4-b.	(CO1, K3)	10
	Consider the 3 processes, P1, P2 and P3 shown in the table.	
	i. Draw Gantt charts illustrating execution of these processes for SJF, FCFS, SRTF, and	
	round robin (quantum=1)	
	 Calculate waiting time for each process for each scheduling algorithm 	

ii. Calculate average waiting time for each scheduling algorithm

Process	Arrival Time	Time Units Required
P1	0	5
P2	1	7
P3	3	4

- 5. Answer any one of the following:-
- 5-a. Discuss the producer consumer and reader's writers problem in detail.(CO2, K2) 10
- 5-b. Read the given information carefully- (CO2,K3)

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Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken:

Process	Allocation	Max	Available	
	ABC	ABC	ABC	
Po	010	7 5 3	332	
P ₁	200	322]	
P ₂	302	902		
P ₃	2 1 1	222		
P ₄	0 0 2	4 3 3		

a) What will be the content of the Need matrix?

b) Is the system in a safe state? If yes, then what is the safe sequence?

6. Answ	ver any <u>one</u> of the following:-	
6-a.	Discuss paging and segmentation with their advantages and	10
	disadvantages.(CO3,K4)	

6-b. Explain how paging supports virtual memory. With neat diagram explain how 10 logical address is translated into physical address.(CO3, K2)

7. Answer any <u>one</u> of the following:

- Explain the cat command in Linux with all its options in detail. Elaborate with 7-a. 10 examples.(CO4, K3)
- Write a shell script to demonstrate the use of grep command and sort command 7-b. 10 together.(CO4, K3)

8. Answer any one of the following:-

- 8-a. Differentiate between WHILE LOOP and UNTIL LOOP in Linux with the help of 10 examples.(CO5, K2)
- 8-b. Discuss the special variables that are used as positional parameters. Explain with 10 examples. (CO5, K2)