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Subject Code:- BMCA0103

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(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 20

1. Attempt all parts:-

1-a. The processes that are inhabited in main memory and are ready and waiting to execute and remained on a list called (CO1,K1) 1

(a) process queue
(b) execution queue
(c) job queue
(d) ready queue

1-b. What is the objective of multiprogramming Operating System? (CO1,K1) 1

(a) Have a process running at all time
(b) Have multiple programs waiting in a queue ready to run
(c) To increase CPU utilization
(d) None of the mentioned

1-c. Each Process has a segment of code called _____ in which the process changes common variables (CO2 ,K2) 1

(a) Non Critical section
(b) Critical Section
(c) Exit Section
(d) Entry section

1-d. The wait-for graph is a deadlock detection algorithm that is applicable when (CO2,K1) 1

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

1-e. Which one of the following is a lazy swapper (CO3,K1) 1

(a) demand paging
(b) segment paging
(c) fragmentation
(d) buddy system

1-f. The time taken to move the disk arm to the desired cylinder is called the (CO3,K1) 1

(a) positioning time
(b) random access time
(c) seek time
(d) rotational latency

1-g. _____ is a Linux command that displays the current username. (CO4,K1) 1

(a) Display
(b) Showuser
(c) Whoami
(d) Currentuser

1-h. The sort order can be reversed using ___ option. (CO4,K1) 1

(a) sort -t
(b) sort -k
(c) sort -r
(d) sort -n

1-i. Which shell is the most common and best to use? (CO5,K1) 1

(a) Korn shell
(b) C shell
(c) Bourne shell
(d) Bash Shell

1-j. The shell script is___ (CO5,K1) 1

(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 context switching. (CO1, K2) 2

2.b. Describe Semaphore. (CO2,K2) 2

2.c. Explain Compaction. (CO3,K2) 2

2.d. Differentiate windows and linux operating system. (CO4,K4) 2

2.e. Explain fork system call. (CO5,K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Define Process. Explain the process state diagram.(CO1, K2) 6

3-b. Explain the different CPU scheduling criteria in detail. (CO1,K2) 6

3-c. Differentiate between Independent Process and Co-operative process. (CO2,K4) 6

3-d. Define deadlock. Discuss all four necessary conditions for deadlock. (CO2,K2) 6

3.e. Explain the concept paging with their advantages and disadvantages. (CO3,K2) 6

3.f. Describe in detail about the structure of LINUX. (CO4,K2) 6

3.g. Explain how an IF ELSE construct and their usage in shell script. Elaborate with example. (CO5,K3) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Explain the layered structure approach with their advantages and disadvantages. (CO1,K2) 10

4-b. Let us consider the following set of processes with their arrival and CPU burst time given in millisecond: 10

Process Name	Arrival Time	CPU Burst Time
P1	2	6
P2	5	2
P3	1	8
P4	0	3
P5	4	4

Calculate the average waiting and turnaround time by using following CPU scheduling algorithms.
i) FCFS
ii) Preemptive SJF/SRTF (CO1,K3)

5. Answer any one of the following:-

5-a. State dining philosopher's problem and give a solution using semaphores. Write structure of philosopher. (CO2,K2) 10

5-b. Explain the Banker's Algorithm for deadlock avoidance with suitable example. (CO2,K2) 10

6. Answer any one of the following:-

6-a. Explain the different file allocation methods with their advantages and disadvantages. (CO3,K2) 10

6-b. Let us Consider the following reference string 1,3,2,4,0,1,7,4,0,2,3,5,1,0,7,1,0,2 . 10

How many page faults will occur for the following Page replacement algorithms
i) Least recently Used (LRU)
ii) Optimal
Assuming three frames (initially empty). (CO3,K3)

7. Answer any one of the following:-

7-a.	Write about the operations that can be performed on both directories and file.Elaborate with examples. (CO4,K3)	10
7-b.	Explain the security levels provided in Linux environment. How to change permissions of a file? (CO4,K2)	10

8. Answer any one of the following:-

8-a.	Discuss the relational operators that are used in Linux shell scripting with examples. (CO5,K3)	10
8-b.	Write a shell script to implement a calculator doing addition, subtraction, multiplication and division. (CO5,K3)	10

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