Printed Page:- 05 **Subject Code**:- **ACSBS0403**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2023 - 2024)

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. A process control block (PCB) also called a ..... (CO1) 1

(a) Task Controlling Box

(b) Task Calling Box

(c) Task Connect Box

(d) none of the mentioned

1-b. Context-switch times are highly dependent on ..... (CO1) 1

(a) Hardware Support

(b) Client Support

(c) User Support

(d) none of the mentioned

1-c. Which module gives control of the CPU to the process selected by the short-term scheduler? (CO2) 1

(a) dispatcher

(b) interrupt

(c) scheduler

(d) none of the mentioned

1-d. The primary distinction between the short term scheduler and the long term scheduler is _____ (CO2) 1

(a) The length of their queues

(b) The type of processes they schedule

(c) The frequency of their execution

(d) None of the mentioned

1-e. For multiple instances of a resource type which algorithm is used (CO3) 1

(a) Divide and Conquer algorithm

(b) Banker's Algorithm

(c) Sorting Algorithm

(d) None of the above

1-f. Which one of the following is the deadlock avoidance algorithm? (CO3) 1

(a) banker's algorithm

(b) round-robin algorithm

(c) elevator algorithm

(d) karn's algorithm

1-g. Which one of the following is the address generated by CPU? (CO4) 1

(a) physical address

(b) absolute address

(c) logical address

(d) none of the mentioned

1-h. Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called? (CO4) 1

(a) fragmentation

(b) paging

(c) mapping

(d) none of the mentioned

1-i. Which of the following is not a feature of Unix? (CO5) 1

(a) multiuser

(b) easy to use

(c) multitasking

(d) portability

1-j. Which option is used with **Is** command to list the directory attributes rather than its contents? (CO5) 1

(a) -d

(b) -a

(c) -b

(d) none of the mentioned

2. Attempt all parts:-

2.a. Define Symmetric Multiprocessing. (CO1) 2

2.b. Define Dispatch Latency. (CO2) 2

2.c. What is Inter-process communication? (CO3) 2

2.d. Define Compaction. (CO4) 2

2.e. Why SCAN algorithm also known as Elevator Algorithm? (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Explain the different types of Distributed Operating System? Briefly Explain them. Write difference between hard real time and soft real time operating system? (CO1) 6

3-b. Explain the role of Operating System as I/O operation. Also explain the concept of context switching. (CO1) 6

3-c. Explain the concept of 'process'. Also, describe the contents of a process control block(PCB). (CO2) 6

3-d. Consider the following code segment: pid t pid; pid = fork(); if (pid == 0) { /* child process */ fork(); thread create(. . .); } fork(); a. How many unique processes are created? b. How many unique threads are created? (CO2) 6

3.e. Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, with a cycle but no deadlock. (CO3) 6

3.f. Discuss the process of overcoming internal Fragmentation explain with example. (CO4) 6

3.g. Explain SSTF Disk Scheduling Algorithm with example. (CO5) 6

SECTION C **50**

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

4-a. Describe Interrupts and its different types? What are the differences between Maskable and Non-maskable Interrupt? (CO1) 10

4-b. Describe the use of Fork and Executive System Calls. Explain Virtual machine and its concept with its history? (CO1) 10

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

5-a. Explain the difference between preemptive and non-preemptive scheduling. Four jobs to be executed on a single processor system arrive at time 0 in the order A, B, C, D. Their burst CPU time requirements are 4, 1, 8, 1 time units respectively. The completion time of A under round robin scheduling with time slice of one time unit is- (CO2) 10

a. 10
b. 4
c. 8
d. 9

Which is correct answer from above options with all steps.

5-b. Consider the set of 5 processes whose arrival time and burst time are given below- (CO2) 10

(Process P1, Arrival Time=03, Burst Time=01;
Process P2, Arrival Time=01, Burst Time=04;
Process P3, Arrival Time=04, Burst Time=02;
Process P4, Arrival Time=00, Burst Time=06;
Process P5, Arrival Time=02, Burst Time=03)

If the CPU scheduling policy is SJF non premptive, calculate the average waiting time and average turnaround time.

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

6-a. Differentiate between Deadlock Avoidance and Deadlock Prevention? Briefly explain The Producer and Consumer Problem to solve process synchronization. (CO3) 10

6-b. Briefly explain the methods used to solve process synchronization using Sleeping Barber problem ? (CO3) 10

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

7-a. Explain Segmentation with Paging? What is virtual memory and give its advantages. (CO4) 10

7-b. How can measure the performance of demand paging? Assume an average page-fault service time is 25 milliseconds and a memory access time is 100 nanoseconds. Find the effective access time? (CO4) 10

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

8-a. Explain different Disk scheduling algorithms SCAN, C-SCAN, C-LOOK with 10

example? (CO5)

8-b. The available space list of a computer memory is specified as follows block address in words (CO5) 10

Starting Address	Block Size
100	50
200	150
450	600
1200	400

Determine the available space list after allocating the space for the stream of requests consisting of the following block sizes:

25,100,250,200,100,150

Use i) FIRST FIT

ii) BEST FIT

and iii) WORST FIT algorithms.