Printed Page:-04 **Subject Code:- ACSE0403B**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - 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 operating system is responsible for?(CO1, K2) 1

(a) bad-block recovery
(b) booting from disk
(c) disk initialization
(d) all of the mentioned

1-b. A program in execution is called_____ (CO1, K1) 1

(a) Process
(b) Instructions
(c) Procedure
(d) Function

1-c. Consider an arbitrary set of CPU-bound processes with unequal CPU burst lengths submitted at the same time to a computer system. Which one of the following process scheduling algorithms would minimize the average waiting time in the ready queue? (CO2, K2) 1

(a) Shortest remaining time first
(b) Round-robin with time quantum less than the shortest CPU burst
(c) Uniform random
(d) Highest priority first with priority proportional to CPU burst length

1-d. The portion of the process scheduler in an operating system that dispatches 1

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processes is concerned with(CO2, K2)

(a) assigning ready processes to CPU
(b) assigning ready processes to waiting queue
(c) assigning running processes to blocked queue
(d) all of the mentioned

1-e. For a deadlock to arise, which of the following conditions must hold simultaneously (CO3, K2) 1

(a) Mutual exclusion
(b) No preemption
(c) Hold and wait
(d) All of the mentioned

1-f. Message passing system allows processes to(CO3, K2) 1

(a) communicate with each other without sharing the same address space
(b) communicate with one another by resorting to shared data
(c) share data
(d) name the recipient or sender of the message

1-g. Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called? (CO4, K2) 1

(a) fragmentation
(b) paging
(c) mapping
(d) none of the mentioned

1-h. When the entries in the segment tables of two different processes point to the same physical location _____(CO4, K2) 1

(a) the segments are invalid
(b) the processes get blocked
(c) segments are shared
(d) all of the mentioned

1-i. Device drivers are implemented to interface(CO5, K2) 1

(a) character devices
(b) block devices
(c) network devices
(d) all of the mentioned

1-j. In which method, the file allocation table contains a separate one level index for each file, the index has one entry for each portion allocated to the file(CO5, K2) 1

(a) Chained allocation
(b) Indexed allocation
(c) Contiguous allocation

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(d) Variable allocation

2. Attempt all parts:-

2.a.	Define Spooling.(CO1, K2)	2
2.b.	Take any example and explain convoy effect? (CO2, K2)	2
2.c.	Define co- operating process and independent process.(CO3, K2)	2
2.d.	Discuss page fault and page hit? (CO4, K2)	2
2.e.	Compare SCAN and C SCAN. (CO5, K3)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Discuss about the functionality of system boot with respect to operating system. (CO1, K2)	6
3-b.	State the advantages and disadvantages of distributed system (CO1, K2)	6
3-c.	Discuss how the following pairs of scheduling criteria conflict in certain settings. i) CPU utilization and response time ii) Average turn around time and maximum waiting time iii)I/O device utilization and CPU utilization (CO2, K3)	6
3-d.	Explain Round Robin scheduling algorithm with example (CO2, K2)	6
3.e.	Discuss the atomic operations of Semaphore and show how mutual exclusion can be implemented.(CO3, K3)	6
3.f.	What is address binding? Explain the concept of dynamic relocation of addresses.(CO4, K2)	6
3.g.	How free space is managed? Explain.(CO5, K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What are the various objectives and functions of Operating systems? Discuss in detail.(CO1, K2)	10
4-b.	What are system calls? Explain different categories of system calls with example. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	Explain in detail about the Threads and their management . (CO2, K2)	10
5-b.	What is the role of Scheduler? What requirement is to be satisfied good scheduling algorithm.(CO2, K3)	10

6. Answer any one of the following:-

6-a.	Discuss Process State Transition diagram with example.(CO3, K2)	10
6-b.	How a producer consumer problem is solved using semaphores? (CO3, K2)	10

7. Answer any one of the following:-

7-a.	What do you understand by fragmentation? What are different techniques to remove fragmentation in case of multiprogramming with fixed and variable partition?(CO4, K2)	10

7-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 .How many page faults will occur for: i. FIFO Page Replacement ii. LRU Page Replacement iii. Optimal Page Replacement Assuming three and four frames (initially empty). (CO4, K3)	10

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

8-a.	Consider a disk with 200 tracks and the queue has random requests from different processes in the order: 55, 58, 39, 18, 90, 160, 150, 38, 184 Initially arm is at 100 moving towards higher track number. Find the Average Seek length using all disk scheduling algorithms (i) FIFO, (ii) SSTF, (iii) SCAN and (iv) C-SCAN (CO5, K3)	10
8-b.	Explain the three allocation methods in file system implementation. Illustrate with proper diagram. (CO5, K2)	10

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