Printed Page:-04 **Subject Code:- AMICSE0403A**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

SEM: IV - THEORY EXAMINATION (2024- 2025)

Subject: Operating System

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.*

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SECTION-A 20

1. Attempt all parts:-

1-a. Which of the following is characteristic of an operating system? (CO1,K1) 1

(a) Resource management
(b) Error recovery
(c) Memory management
(d) All the above

1-b. In Unix, which system call creates the new process. (CO1,K1) 1

(a) create
(b) fork
(c) new
(d) none of the mentioned

1-c. From the time of submission of a process to the time of completion, The interval is termed as(CO2,k1) 1

(a) waiting time
(b) turnaround time
(c) response time
(d) throughput

1-d. The most optimal CPU scheduling algorithm is (CO2,K1) 1

(a) FCFS
(b) SJF

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(c) Priority
(d) Round Robin

1-e. The wait-for graph is a deadlock detection algorithm that is applicable when (CO3,K2) 1

(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-f. A semaphore is a shared integer variable (CO3,K1) 1

(a) that can not drop below zero
(b) that can not be more than zero
(c) that can not drop below one
(d) that can not be more than one

1-g. Which one of the following is the address generated by CPU? (CO4,K1) 1

(a) Logical address
(b) Absolute address
(c) Physical address
(d) None of the mentioned

1-h. Compaction is (CO4,K1) 1

(a) a technique for overcoming internal fragmentation
(b) a paging technique
(c) a technique for overcoming fatal error
(d) a technique for overcoming external fragmentation

1-i. A process is moved to wait queue when I/O request is made with _ (CO5,K1) 1

(a) non-blocking I/O
(b) blocking I/O
(c) asynchronous I/O
(d) synchronous I/O

1-j. Select one of RAID type doesn't use parity for data protection.(CO5,K1) 1

(a) RAID 1
(b) RAID 4
(c) RAID 6
(d) RAID 5

2. Attempt all parts:-

2.a. Explain user mode and kernel mode in brief. (CO1,K2) 2

2.b. Explain CPU bounded and I/O bounded process.(CO2,K2) 2

2.c. Differentiate between Co- operating and independent process.(CO3,K4) 2

2.d. Explain the term demand paging. (CO4,K2) 2

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2.e. Explain the term rotational latency. (CO5,K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Explain the Microkernel structure with their advantages and disadvantages. (CO1,K2) 6

3-b. Explain the different types of services provided by operating system. (CO1,K2) 6

3-c. Describe the Process Control Block (PCB) with their components.(CO2,K2) 6

3-d. Explain the process state transition diagram in detail. (CO2,k2) 6

3.e. Define deadlock. Explain the necessary conditions for a deadlock. (CO3,K2) 6

3.f. Define Thrashing. Explain the cause of thrashing in detail. (CO4,K2) 6

3.g. Explain the following 6
i) File types
ii) File operations
iii) File attributes. (CO5,k2)

SECTION-C 50

4. Answer any one of the following:-

4-a. Differentiate between Network and Distributed operating system with their advantages and disadvantages. (CO1,K4) 10

4-b. Explain system call. Discuss different types of system calls with suitable example. (CO1,K2) 10

5. Answer any one of the following:-

5-a. Explain the criteria for evaluating the CPU scheduling algorithm? (CO2,K2) 10

5-b. Let us consider the following set of five processes with the length of CPU burst time given in milliseconds: 10

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

Calculate the average waiting time and turnaround time by using the Non Preemptive SJF and Non Preemptive Priority CPU Scheduling algorithms.(Given Minimum Priority = 1, Maximum Priority = 4). (CO2,K3)

6. Answer any one of the following:-

6-a. Explain the Banker's algorithm for deadlock avoidance with an example.(CO3,K2) 10

6-b. State dining philosopher's problem and give a solution using semaphores. Write structure of philosopher. (CO3,K2) 10

7. Answer any one of the following:-

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7-a.	Let us consider the following page reference string's 1, 2, 3, 4, 2 ,1, 5, 6, 2,1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 5.Find the number of page faults would be occur by using following page replacement algorithms. i. Optimal ii. Least Recently Used (LRU) Initially three frames are empty. (CO4,K3)	10
7-b.	Define Paging and also explain with the help of supporting diagram how TLB improves the performance of a paging system. (CO4,K4)	10

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

8-a.	Suppose that a disk drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests in FIFO order 86,1470,913,1774,948,1509, 1022, 1750, 130 starting from current head position. What are the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms i) FCFS ii) SSTF iii) SCAN (CO5,K3)	10
8-b.	Explain the file allocation methods with their advantages and disadvantages. (CO5,K2)	10

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