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 (2023 - 2024)

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.*

SECTION-A 20

1. Attempt all parts:-

1-a. Master– slave relationship exist in (CO1) 1

(a) Symmetric multiprocessing

(b) Asymmetric Clustering

(c) Symmetric Clustering

(d) Asymmetric multiprocessing

1-b. System call returns the process identifier of a terminated child.(CO1) 1

(a) wait

(b) exit

(c) fork

(d) get

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

(a) waiting time

(b) turnaround time

(c) response time

(d) throughput

1-d. The FCFS CPU Scheduling algorithm said : (CO2) 1

(a) executes the job first that needs a minimal processor

(b) the job first executes that comes last in the queue

(c) the job first executes that has maximum processor needs
(d) the job first executes that came in first in the queue

1-e. The circular wait condition can be prevented by (CO3) 1

(a) defining a linear ordering of resource types
(b) using thread
(c) using pipes
(d) all of the mentioned

1-f. Semaphores are mostly used to implement (CO3) 1

(a) System calls
(b) IPC mechanisms
(c) System protection
(d) None of the mentioned

1-g. Virtual memory is (CO4) 1

(a) an extremely large main memory
(b) an extremely large secondary memory
(c) an illusion of extremely large main memory
(d) a type of memory used in super computers

1-h. CPU fetches the instruction from memory according to the value of (CO4) 1

(a) program counter
(b) status register
(c) instruction register
(d) program status word

1-i. The time taken to move the disk arm to the desired cylinder is called the (CO5) 1

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

1-j. In the single level directory. (CO5) 1

(a) All files are contained in the same directory
(b) All files are contained in different directories all at the same level
(c) Depends on the operating system
(d) None of the mentioned

2. Attempt all parts:-

2.a. Describe the operating system functions. (CO1) 2

2.b. Define the term dispatch latency.(CO2) 2

2.c. Differentiate between Co-operating and independent processes. (CO3) 2

2.d. Explain the demand paging. (CO4) 2

2.e. Write about different types of operation performed on file. (CO5) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Explain the Layered structure of an operating system with their advantages and disadvantages.(CO1) 6

3-b. Explain the various services provided by operating system in detail. (CO1) 6

3-c. Explain the process state transition diagram in detail. (CO2) 6

3-d. Differentiate between user-level and kernel-level thread with their advantages and disadvantages. (CO2) 6

3.e. Define Deadlock. Also explain the necessary condition's for deadlock. (CO3) 6

3.f. Given memory partitions of 100KB, 500KB, 200KB, 300KB, and 600KB (in order).How would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 278KB, 415KB, 117KB, and 436KB (in order)? Which algorithm makes the most efficient use of memory? (CO4) 6

3.g. Define RAID. Explain the different levels of RAID. (CO5) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Explain the following operating system with their advantages & disadvantages 10
i) Batch operating system
ii) Multitasking operating system
iii) Time sharing operating system
iv) Real time operating system (CO1)

4-b. Explain the different functions of an operating system and discuss the various services provided by an operating system. (CO1) 10

5. Answer any one of the following:-

5-a. 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	3	6	1
P2	4	4	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, Preemptive SJF(SRTN/SRTF) and Preemptive priority CPU Scheduling algorithms.(Given Minimum priority = 1, Maximum Priority = 4). (CO2)

5-b. Explain process. Also describe the contents of a process control block in details. (CO2) 10

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

6-a. Define semaphore. Explain the solution for Reader-Writer problem by using the semaphore. (CO3) 10

6-b. Let us consider the following snapshot : 10

Process	Allocation				Maximum				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P0	3	1	0	0	4	6	5	0	4	2	0	0
P1	0	0	1	2	0	0	1	2				
P2	1	3	3	4	6	6	5	6				
P3	2	3	5	4	4	3	5	6				
P4	0	0	3	2	0	6	5	2				

i) What is the content of need matrix?
ii) Is the system in a safe state or not?
iii) If a request from process P3 arrives for (0, 2, 0, 0) ,the request of P3 is granted immediately or not.(CO3)

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

7-a. Define Thrashing. Explain the cause of thrashing. Also write the solution to overcome the problem of thrashing. (CO4) 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 would occur for the following page replacement algorithms 10
i. FIFO Page Replacement
ii. Least Recently Used Page Replacement
iii. Optimal Page Replacement .
Assuming there are three frames initially empty. (CO4)

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

8-a. Suppose that the head of moving head disk with 200 tracks numbered 0 to 199 is currently serving the request at track 143 and has just finished a request at track 125. If the queue request is kept in FIFO order, 86, 147, 91, 177 , 94, 150,102, 175, 130. What is the total head movement to satisfy these requests for the following disk scheduling algorithms 10
i) SCAN
ii) FCFS
iii) SSTF
iv) LOOK (CO5)

8-b. Explain the file allocation methods with their advantages and disadvantages. (CO5) 10