Printed Page:- **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 (20 ..... - 20 .....)

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. Which technique was introduced because a single job could not keep both the CPU and I/O devices busy?(CO1) 1

(a) . Time-sharing

(b) Spooling

(c) preemptive scheduling

(d) Multiprogramming

1-b. Name the system in which the processors do not share memory and each processor that its own local memory.(CO1) 1

(a) Tightly coupled system

(b) Parallel processing system

(c) . Loosely coupled system

(d) Batch processing system

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) 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 processes is concerned with(CO2) 1

(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. The resource allocation graph is not applicable to a resource allocation system(CO3) 1

(a) with multiple instances of each resource type
(b) with a single instance of each resource type
(c) single & multiple instances of each resource type
(d) none of the mentioned

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 of the following is/are the basic algorithms that are used for selection of a page to replace in replacement policy. I) Optional ii) Least recently used (LRU) iii) First in first out (FIFO) iv) Last in first out (LIFO) [CO4] 1

(a) i, ii and iii only
(b) ii, iii and iv only
(c) i, iii and iv only
(d) All i, ii, iii and iv

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

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

1-i. In the sequential access method, information in the file is processed [CO5] 1

(a) one disk after the other, record access doesn't matter
(b) one record after the other
(c) one text document after the other
(d) none of the mentioned

1-j. In the which algorithm, the disk arm starts at one end of the disk and moves toward the other end, servicing requests till the other end of the disk. At the other end, the direction is reversed and servicing continues.(CO5) 1

(a) LOOK
(b) SCAN
(c) C-SCAN
(d) C-LOOK

2. Attempt all parts:-

2.a.	Differentiate between uniprocessor and multiprocessor system.(CO1)	2
2.b.	Describe context switching?(CO2)	2
2.c.	Draw a resource allocation graph (RAG) by taking two processes and two resources.(CO3)	2
2.d.	Explain the need of Virtual Memory?(CO4)	2
2.e.	Explain File System Protection .(CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain file permission in LINUX.(CO5)	6
3-b.	Describe Monolithic and Microkernel Systems. Mention the differences between them?(CO1)	6
3-c.	Explain Round Robin scheduling algorithm with example(CO2)	6
3-d.	Explain SJF scheduling algorithm with example. (CO2)	6
3.e.	Elaborate the Reader-Writer problem in detail. (CO3)	6
3.f.	Let us Consider the following page reference string.1, 2, 3, 4, 2 ,1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6 Find the number of page faults by using Optimal page replacement algorithm with 4 frames?.(CO4)	6
3.g.	Describe various file access methods. Differentiate between sequential and indexed sequential methods.	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	List out and explain briefly the various services that the operating system provides to programs and users.(CO1)	10
4-b.	Explain the layered approach to the structuring of an operating system along with the relevant diagram.(CO1)	10

5. Answer any one of the following:-

5-a.	a) Define Process? Explain process State diagram? b) Explain about process schedulers? (CO2)	10
5-b.	Describe the four situations under which CPU scheduling decisions take place. Explain the algorithmic evaluation in CPU scheduling(CO2)	10

6. Answer any one of the following:-

6-a.	Illustrate critical section problem along with the necessary conditions that must satisfy the solution. Explain any one solution. (CO3)	10

6-b.	Discuss the inter-process communication schemes along with their advantages and drawbacks.(CO3)	10
7. Answer any <u>one</u> of the following:-		
7-a.	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)	10
7-b.	What do you understand by fragmentation? What are different techniques to remove fragmentation in case of multiprogramming with fixed and variable partition?(CO4)	10
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 i)SCAN ii) FCFS iii) SSTF disk scheduling algorithm.(CO5)	10
8-b.	A certain moving arm disk storage with one head has the following specifications- · Number of tracks per surface = 200, · Disk rotation speed = 2400 RPM, · Track storage capacity = 62500 bits, · Average latency = P msec, · Data transfer rate = Q bits/sec, What is the value of P and Q? (CO5)	10