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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

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1. Attempt all parts:-

- | | | |
|------|--|---|
| 1-a. | CLI stands for [CO1] | 1 |
| | (a) Command line interpreter | |
| | (b) Character language interface | |
| | (c) command line Interface | |
| | (d) Communication line interface | |
| 1-b. | Which of the following is a large kernel, including scheduling file system, networking, device drivers, memory management and more.(CO1) | 1 |
| | (a) Monolithic kernel | |
| | (b) Micro kernel | |
| | (c) Macro kernel | |
| | (d) Mini kernel | |
| 1-c. | Which of the following statements are true? I. Shortest remaining time first scheduling may cause starvation
II. Preemptive scheduling may cause starvation
III. Round robin is better than FCFS in terms of response time (CO2) | 1 |

- (a) I only
 (b) I and III only
 (c) II and III only
 (d) I, II and III
- 1-d. Which of the following is/are shared by all the threads in a process? 1
 I. Program counter II. Stack III. Address space IV. Registers [CO2]
 (a) I and II only
 (b) III only
 (c) IV only
 (d) III and IV only
- 1-e. The content of the matrix Need is [CO3] 1
 (a) Allocation – Available
 (b) Max – Available
 (c) Max – Allocation
 (d) Allocation – Max
- 1-f. The number of resources requested by a process : (CO3) 1
 (a) must always be less than the total number of resources available in the system
 (b) must always be equal to the total number of resources available in the system
 (c) must not exceed the total number of resources available in the system
 (d) must exceed the total number of resources available in the system
- 1-g. 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-h. Dirty bit is used to show(CO4) 1
 (a) Page with corrupted data
 (b) Wrong page in memory
 (c) Page that is modified after being loaded in the cache memory
 (d) page that is less frequently accessed
- 1-i. Which one is true for the tree structured directories ?[CO5] 1

- (a) the tree has the stem directory
- (b) the tree has the leaf directory
- (c) the tree has the root directory
- (d) all 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. List out any four process control system calls?(CO1) 2
- 2.b. What do you mean by waiting time?[CO2] 2
- 2.c. What is semaphore? Mention its importance in operating system. [CO3] 2
- 2.d. Differentiate between paging and Demand paging.[CO4] 2
- 2.e. Define rotational latency and disk bandwidth.(CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. What is operating system? Explain the components of operating System in detail. [CO1] 6
- 3-b. Describe differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems?(CO1) 6
- 3-c. Compare and contrast Short term, Mid -Term and Long term scheduling.[CO2] 6
- 3-d. Draw the state diagram of a process from its creation to termination, including all transitions, and briefly elaborate every state and every transition.(CO2) 6
- 3.e. Illustrate the Banker's algorithm for deadlock avoidance with an example.(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. Suppose the order of request is given as (82,170,43,140,24,16,190) and current position of Read/Write head is at 50. Use FCFS disk scheduling algorithm to calculate the total seek time?(CO5) 6

4. Answer any one of the following:-

- 4-a. Explain the following types of operating system (a) Multiprocessing (b) Multitasking (c) Batch Processing (d) Multithreading (e) Distributed (CO1) 10
- 4-b. What are system calls? Explain different categories of system calls with example. (CO1) 10

5. Answer any one of the following:-

- 5-a. What do you mean by PCB? Where is it used? What are its contents? Explain.[CO2] 10
- 5-b. Explain in detail about the Threads and their management . (CO2) 10

6. Answer any one of the following:-

- 6-a. Describe the Bounded - buffer problem and give a solution for the same using semaphores. Write the structure of producer and consumer processes.(CO3) 10
- 6-b. Write software solution for critical section problem when two processes are executing in the system.(CO3) 10

7. Answer any one of the following:-

- 7-a. "Let us consider the following. What is the physical address for the following logical addresses? (CO4) 10
1. <0, 430>
 2. <1, 11>
 3. <2, 100>
 4. <3, 425>
 5. <4, 95>

Segment No.	Base Address	Length
0	1219	700
1	2300	14
2	90	100
3	1327	580
4	1952	96

- 7-b. Discuss the advantages and disadvantages of multilevel paging and inverted page tables.(CO4) 10

8. Answer any one of the following:-

- 8-a. Explain the file allocation methods. (CO5) 10
- 8-b. Consider the following disk request sequence for a disk with 100 tracks 98, 137, 122, 183, 14, 133, 65, 78. Head pointer starting at 54 and moving towards track 10

number 0. Find the number of head movements in cylinders using LOOK scheduling.(CO5)

REG. MAY 2024