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Subject Code:- ACSE0403A

Roll. No: 2 0 0 1

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2021 - 2022)

Subject: Operating Systems

Time: 3 Hours

Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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. What is operating system? (CO1) 1

(a) collection of programs that manages hardware resources

(b) system service provider to the application programs

(c) link to interface the hardware and application programs

(d) all of the mentioned

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

(a) resource management

(b) error recovery

(c) memory management

(d) All the above

1-c. The processes that are inhabited in main memory and are ready and waiting to execute and remained on a list called (CO2) 1

(a) process queue

(b) execution queue

(c) job queue

(d) ready queue

1-d. Under which category Round-Robin scheduling falls ? (CO2) 1

(a) Preemptive scheduling

(b) Nonpreemptive scheduling

(c) All of the mentioned

(d) None of the mentioned

1-e. Which of the following condition is required for a deadlock to be possible? (CO3) 1

(a) mutual exclusion

(b) a process may hold allocated resources while awaiting assignment of other resources

(c) no resource can be forcibly removed from a process holding it

(d) all of the mentioned

1-f. A semaphore is a shared integer variable (CO3) 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. The principle of locality of reference justifies the use of (CO4) 1

(a) virtual memory
(b) interrupts
(c) main memory
(d) cache memory

1-h. External fragmentation exists when? (CO4) 1

(a) enough total memory exists to satisfy a request but it is not contiguous
(b) the total memory is insufficient to satisfy a request
(c) a request cannot be satisfied even when the total memory is free
(d) none of the mentioned

1-i. In which algorithm, the disk arm goes as far as the final request in each direction, then reverses direction immediately without going to the end of the disk (CO5) 1

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

1-j. In the sequential access method, information in the file is processed (CO5) 1

(a) one disk after the other, record access doesnt matter
(b) one record after the other
(c) one text document after the other
(d) none of the mentioned

2. Attempt all parts:-

2.a. Explain time sharing operating system? 2

2.b. What is PCB? Specify the information maintained in it. 2

2.c. List two atomic operations of Semaphore. 2

2.d. Distinguish between logical address space and physical address space. 2

2.e. Define seek time and latency time. 2

SECTION B 30

3. Answer any <u>five</u> of the following:-

3-a. Describe Monolithic and Microkernel Systems. Mention the differences between them? (CO1) 6

3-b. Explain the evolution of operating system in detail (CO1) 6

3-c. What are the criteria for evaluating the CPU scheduling algorithm?Explain (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. Explain Producer/Consumer problem in detail. (CO3) 6

3.f. Explain the various page table structures in detail. (CO4) 6

3.g. Explain various file allocation methods. Differentiate between contiguous and indexed file allocation schemes. (CO5) 6

SECTION C 50

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

4-a. Define essential properties of the following types of Operating system: i) Batch operating system ii) Interactive operating system iii) Time sharing operating system iv) Real time operating system v) Distributed operating system (CO1) 10

4-b. What is system calls in OS? Explain in detail with its types. (CO1) 10

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

5-a. What is the role of Scheduler? What requirement is to be satisfied good scheduling algorithm. (CO2) 10

5-b. What do you mean by Context Switching? Elaborate the actions taken by the kernel to context-switch between processes. (CO2) 10

6. Answer any one of the following:-

6-a. Discuss any two deadlock handling methods in detail. (CO3) 10

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

7. Answer any one 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. Explain with the help of supporting diagram how TLB improves the performance of a demand paging system. (CO4) 10

8. Answer any one of the following:-

8-a. Suppose that the head of moving [illegible] 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)FCFS II) 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? 10
(CO5)