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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 (2022-2023.)****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 of the following operating systems supports only real-time applications? (CO1) 1
- (a) Batch OS
 - (b) Distributed OS
 - (c) Real-time OS
 - (d) Network OS
- 1-b. Which of the following can implement the message passing and control? (CO1) 1
- (a) application software
 - (b) operating system
 - (c) software
 - (d) kernel
- 1-c. 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-d. Selects the statements which are true according to (i)starvation may be caused by Shortest remaining time first scheduling (CO2) 1
- ii. starvation may be caused by Preemptive scheduling
- iii. in terms of response time, Round robin is better than FCFS
- (a) i only
- (b) ii and iii only
- (c) i and iii only
- (d) i and ii and iii
- 1-e. The following conditions must be satisfied to solve the critical section problem? (CO3) 1
- (a) Mutual Exclusion
- (b) Progress
- (c) Bounded Waiting
- (d) All Of The Mentioned
- 1-f. What are the two kinds of semaphores (CO3) 1
- (a) mutex & counting
- (b) binary & counting
- (c) counting & decimal
- (d) decimal & binary
- 1-g. Which of the following is NOT an advantage of using shared, dynamically linked libraries as opposed to using statically linked libraries ? (CO4) 1
- (a) Smaller sizes of executable files
- (b) Lesser overall page fault rate in the system
- (c) Faster program start-up
- (d) Existing programs need not be re-linked to take advantage of newer versions of libraries
- 1-h. State true or false. I) With paging, each process is divided into relatively small, fixed-size pages.ii) Segmentation provides for the use of pieces of varying size. (CO4) 1
- (a) True, False
- (b) True, True

- (c) False, True
(d) False, False
- 1-i. Storage devices like tertiary storage, magnetic disk comes under (CO5) 1
(a) Volatile storage
(b) Non-volatile storage
(c) Dynamic storage
(d) Stable storage
- 1-j. File management function of the operating system includes i) File creation and deletion ii) Disk scheduling iii) Directory creation iv) Mapping file in secondary storage (CO5) 1
(a) i, ii and iii only
(b) i, iii and iv only
(c) ii, iii and iv only
(d) All i, ii, iii and iv

2. Attempt all parts:-

- 2.a. Explain simple batch system? (CO1) 2
2.b. Give difference between Job-scheduling & CPU-scheduling. (CO2) 2
2.c. Define Multiprocessor Scheduling. (CO3) 2
2.d. What is Internal Fragmentation? (CO4) 2
2.e. Explain RAID. (CO5) 2

SECTION B

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3. Answer any five of the following:-

- 3-a. What are system calls? Explain the difference categories of the system calls. (CO1) 6
3-b. Define Process Transition Diagram with the help of a neat diagram. (CO2) 6
3-c. Explain Round Robin scheduling algorithm with example (CO2) 6
3-d. What do you understand by Deadlock? Write necessary conditions for occurring the deadlock in a system. (CO3) 6
3.e. Elaborate the Bound Buffer problem in detail. (CO3) 6
3.f. State the benefits of Virtual Memory System? (CO4) 6
3.g. What do you understand by file management system? Define file system protection and security. (CO5) 6

SECTION C

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4. Answer any one of the following:-

- 4-a. Describe the goal, functions and characteristics of operating system in detail. (CO1) 10
- 4-b. Write the importance of kernel in operating system. Differentiate between Monolithic and Microkernel systems in detail. (CO1) 10

5. Answer any one of the following:-

- 5-a. Distinguish between i) Scheduler and Dispatcher ii) Multiprogramming and multiprocessing iii) Job scheduling and CPU scheduling (CO2) 10
- 5-b. Differentiate between :- i) Preemptive and non preemptive scheduling ii) Process and Thread iii) Long Term Scheduler and Mid Term Scheduler (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. What is critical section? Explain three necessary conditions for critical section problem in detail. (CO3) 10

7. Answer any one of the following:-

- 7-a. Discuss the advantages and disadvantages of paging and segmentation. (CO4) 10
- 7-b. When do page faults occur? Consider the reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults and page fault rate occur for the FIFO, LRU and optimal replacement algorithms, assuming three, four page frames? (CO4) 10

8. Answer any one of the following:-

- 8-a. Consider a disk with 200 tracks and the queue has random requests from different processes in the order: 55, 58, 39, 18, 90, 160, 150, 38, 184 initially arm is at 100. Find the average seek time using scheduling algorithms given as (i) FIFO, (ii) SSTF, (iii) SCAN, (iv) C-SCAN (CO5) 10
- 8-b. Explain the file allocation methods. (CO5) 10