14683

B. Tech 4th Semester Examination

Operating System Concepts (O.S.)

IT-4002

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note :   Attempt any one question from section A, B, C and D. Section E is compulsory. Each question carries equal marks.

SECTION - A

1. (a)   What is an Operating system? Explain the different issues involved in designing and implementation of an operating system.   (10)

   (b)   Give reasons why interprocess communication is required. Explain the different fundamental models of interprocess communication.   (10)

2. (a)   List five services provided by an operating system that are designed to make it more convenient for users to use the computer system. In what cases it would be impossible for user-level programs to provide these services? Explain.   (10)

   (b)   Describe the differences between symmetric and asymmetric multiprocessing. What are advantages and disadvantage of multiprocessor systems?   (10)

SECTION - B

3. (a) Explain the critical section problem. What is the meaning of the term busy waiting? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? Explain your answer. (10)

   (b) What are the four necessary conditions that must hold for a deadlock to occur? Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free. (10)

4. (a) Define Dining-Philosophers problem. Give solution to Dining-Philosophers problem using monitors. (10)

   (b) Explain Banker's algorithm for deadlock avoidance. Explain issue involved in Process Termination and Resource Preemption techniques used in recovery from deadlock. (10)

SECTION - C

5. (a) Explain the concept of Demand Paging. Also explain the steps involved in handling a page fault. (10)

   (b) Explain FCFS, SSTF, C-SCAN Disk Scheduling algorithm. (10)

6. (a) What is Belady's anomaly? Does LRU algorithm for page replacement, suffer from this anomaly? Justify your answer with the help of an example. (10)

   (b) Suppose that the head of a moving-head disk with 200 tracks, numbered 0 to 199, is currently serving a request at track 143 and has just finished a request at track 125. The queue of requests is kept in the FIFO order: (10)

   86, 147, 91, 177, 94, 150, 102, 175, 130.

What is the total number of head movements needed to satisfy these requests for the following disk-scheduling algorithms?

(a) FCFS scheduling

(b) LOOK scheduling

(c) SSTF scheduling

(d) C-SCAN scheduling

SECTION - D

7. (a) Explain the various file allocation methods and compare them with respect to space and time consumed by each of them. (10)

(b) Consider a file system on a disk that has both logical and physical block sizes of 512 bytes. Assume that the information about each file is already in memory. For each of the three allocation strategies (contiguous, linked, and indexed), answer these questions:

(i) How is the logical-to-physical address mapping accomplished in this system? (For the indexed allocation, assume that a file is always less than 512 blocks long.)

(ii) If we are currently at logical block 10 (the last block accessed was block 10) and want to access logical block 4, how many physical blocks must be read from the disk? (10)

8. (a) What is the difference between absolute and relative path name of a file? Compare sequential and random file access methods with respect to their usefulness in today's applications. (10)

[P.T.O.]

(b) Consider the following augmentation of a remote-file-access protocol. Each client maintains a name cache that caches translations from file names to corresponding file handles. What issues should we take into account in implementing the name cache? (10)

SECTION - E

9. (a) Explain the term Spooling and state the advantages of this technique.

(b) Differentiate between synchronous and asynchronous I/O with the help of an example

(c) What does a cycle in the Resource Allocation Graph indicate:

(i) when there is single instance of each resource type

(ii) when there are multiple instances of each resource type

(d) Compare Best-fit, worst-fit and first-fit allocation algorithms.

(e) What factors should be considered while deciding the swap-space size? (5×4=20)