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Total Number of Pages: 02

Course: B.Tech
Sub_Code: RCS5C003

5th Semester Back Examination: 2025-26

SUBJECT: Operating Systems

BRANCH(S): CSE, CSEAI, CSEAIML, CSEDS, CSIT, CST, ELECTRICAL & C.E, IT

Time: 3 Hours

Max Marks: 100

Q.Code: U125

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- a) Define an Operating System. Give two examples of OS services.
- b) What is a system call?
- c) Differentiate between a process and a thread.
- d) What is page fault?
- e) What is a virtual machine in operating systems?
- f) What is contiguous memory allocation?
- g) What is a monitor in process synchronization?
- h) What is mass storage structure?
- i) List the four necessary conditions of deadlock.
- j) What is hardware synchronization?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) Describe the layered structure of an Operating System.
- b) Explain process states and process control block (PCB) with suitable diagram.
- c) Explain First-Come-First-Served (FCFS) scheduling with an example.
- d) Compare preemptive and non-preemptive scheduling.
- e) Explain producer-consumer problem using semaphores.
- f) Explain paging with neat diagram.
- g) Explain segmentation and its advantages.
- h) Describe the concept of thrashing in virtual memory.
- i) A process accesses pages in the following order:
1, 2, 3, 4, 2, 1, 5, 2, 4, 3
Using 3 frames, compute the number of page faults using FIFO.

- j) Explain the concept of disk fragmentation.
- k) Describe I/O buffering techniques.
- l) Compare centralized and distributed operating systems.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain the architecture, components, advantages, and challenges of Distributed Operating Systems. **(16)**

Q4 Describe the critical section problem in detail. Explain Peterson's solution for two processes with correctness proof. **(16)**

Q5 Explain in detail the memory management strategies: fixed partitioning, dynamic partitioning, buddy system, and slab allocation. **(16)**

Q6 Assume the disk has cylinder numbers ranging from 0 to 199.
Discuss the various disk scheduling algorithms - FCFS, SSTF, SCAN, C-SCAN, LOOK, and C-LOOK.
For the following request queue, compute the total head movement for each algorithm:
Request Queue: **98, 183, 37, 122, 14, 124, 65, 67**
Initial Head Position: **53**