

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:3141601****Date:11-01-2024****Subject Name: Operating System and Virtualization****Time: 10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

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| Q.1 | (a) Define OS. Explain the basic functions of OS. | 03 |
| | (b) List types of OS structure and Differentiate between Monolithic and Microkernel. | 04 |
| | (c) What is system call? Explain steps for system call execution with neat diagram. | 07 |
| Q.2 | (a) What is PCB? Discuss its major fields. | 03 |
| | (b) Explain process states model along with transition by a labelled diagram. | 04 |
| | (c) What do you mean by scheduling? Discuss in brief types of scheduling and kind of schedulers too. | 07 |
| OR | | |
| | (c) Consider Five Processes P1 to P5 arrived at same time. They have estimated running time 10,2,6,8 and 4 seconds, respectively. Their Priorities are 3,2,5,4 and 1, respectively with 5 being highest Priority. Find the average turnaround time and average waiting time for Round Robin (q=3) and Priority Scheduling algorithm. | 07 |
| Q.3 | (a) Give the functions of following UNIX commands: ps, fork, join | 03 |
| | (b) What is deadlock? List the necessary conditions that lead to the deadlock. How deadlock can be prevented? | 04 |
| | (c) What is Semaphore? Give the implementation of Bounded Buffer (Producer Consumer) Problem using Semaphore. | 07 |
| OR | | |
| Q.3 | (a) Explain Race condition, mutual exclusion and critical region. | 03 |
| | (b) Explain the use of Banker's Algorithm for deadlock avoidance. | 04 |
| | (c) What is Critical section Problem and list the requirements to solve it. Write Peterson's Solution for the same. | 07 |
| Q.4 | (a) Give difference between Internal and External Fragmentation. | 03 |
| | (b) Discuss DMA in brief. | 04 |
| | (c) What is Paging? Explain paging mechanism in MMU with example | 07 |
| OR | | |
| Q.4 | (a) Give difference between Paging and Segmentation | 03 |
| | (b) What is Buffering? Why is it required in I/O handling? | 04 |
| | (c) Consider the page references 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, with 4 page frame. Find number of page fault using Optimal Page replacement and Least Recently Used algorithm | 07 |
| Q.5 | (a) Explain Device controller in brief | 03 |
| | (b) How virtual address is converted into physical address with example | 04 |

- (c) Define seek time and rotational latency. Assume that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 100. The queue of pending requests is 23, 89, 132, 42, 189. Calculate seek time for FCFS and SSTF disk scheduling algorithm. **07**

OR

- Q.5** (a) What is RAID? Explain in brief. **03**
(b) Explain memory management with bitmaps. **04**
(c) Explain virtual machine and virtualization concepts in brief. **07**

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