

[This question paper contains 2 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 2940
Unique Paper Code : 2342572401/232202401
Name of the Paper : Operating Systems
Name of the Course : B.A. Prog. DSC
Semester : IV
Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** is compulsory. Attempt any **FOUR** questions from **Section B**. Parts of a question should be attempted together.

Section A

1.
 - (a) What is the convoy effect. Give an example. (3)
 - (b) What is virtual memory. Describe its purpose. (3)
 - (c) Write any three major functions of an operating system with regard to memory management? (3)
 - (d) Write the actions taken by a kernel to context-switch between processes. (3)
 - (e) What is many-to-many multithreading model. Draw the diagram also. (3)
 - (f) Name any two operations which can be performed on a directory. List any one disadvantage of Two-level directory structure. (3)
 - (g) List any three advantages of multiprocessor systems. (3)
 - (h) Consider a logical address space of 256 pages with a 4-KB page size, mapped onto a physical memory of 64 frames:
 - i. How many bits are required in logical address?
 - ii. How many bits are required in physical address?(3)
 - (i) Draw the resource allocation graph for the given scenario as follows: (3)
P1 is waiting for R1 and holding R2
P2 is holding R1
P3 is holding R1 and waiting for R2
P4 is holding R2.
State whether a deadlock exists or not with justification.
 - (j) Distinguish between absolute and relative path name (3)

Section B

2.
 - (a) What is demand paging in an operating system. Describe its advantages and disadvantages. (5)
 - (b) A system has a main memory access time of 100 ns, Translation Look aside Buffer (TLB) access time of 20 ns, and a TLB hit ratio of 95%. Calculate effective memory access time with TLB and without TLB (5)
 - (c) What is the layered approach of operating system design. Write its two advantages and two disadvantages. (5)
3.
 - (a) Distinguish between the following: (5)
 - i. Multiprogramming and Multitasking
 - ii. Ready queue and Job queue
 - (b) What is internal fragmentation. Which memory management technique used to address this issue. (5)

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- (c) A memory system has free blocks of sizes: 350 KB, 150 KB, 500 KB, and 250 KB. If processes arrive in the order: P1: 200 KB, P2: 120 KB, P3: 450 KB, P4: 180 KB. (5)
- Allocate the memory to the processes using First-Fit and Best-Fit memory management algorithms.
 - Which of the above algorithm results in minimum external fragmentation? Justify your answer briefly.
4. (a) A disk scheduling system has the following queue of pending requests (in order of arrival): [98, 183, 37, 122, 14, 124, 65, 67]. The disk head starts at position 51. The disk tracks range from 0 to 199. Compute the total head movement using the SCAN algorithm (head moving towards higher-numbered tracks first). (5)
- (b) Define time quantum in Round Robin scheduling. How very small and very large values of time quantum affect system performance. (5)
- (c) Explain dual mode of operation and its purpose. (5)
5. (a) Define the following terms: (10)
- Random Access Time in magnetic disk
 - System Program
 - Long-term scheduler
 - Segmentation
- (b) Describe the various operations that can be performed on a file in an operating system. (5)
6. (a) Consider the following set of processes with their arrival times and CPU burst times (in milliseconds): (10)
- | Process ID | Arrival Time | Burst Time |
|------------|--------------|------------|
| P1 | 0 | 7 |
| P2 | 2 | 4 |
| P3 | 4 | 1 |
| P4 | 5 | 4 |
- Using the Shortest Remaining Time-First (SRTF) and First Come First Serve (FCFS) scheduling algorithms:
- Draw the Gantt chart showing the execution order of processes.
 - Calculate the turnaround time and waiting time for each process.
 - Compute the average waiting time and average turnaround time.
- (b) What is deadlock in process management? Write briefly the necessary conditions of deadlock. (5)
7. (a) Consider the following page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2. Assuming demand paging with three frames: (10)
- Compute the page faults using the following page replacement algorithms:
 - First in first out (FIFO)
 - Least Recently Used (LRU)
 - Compare the results and identify which algorithm performs better for the given reference string.
- (b) What is Open-Source Software? Write an advantage and a disadvantage of an Open-Source Operating System? (5)

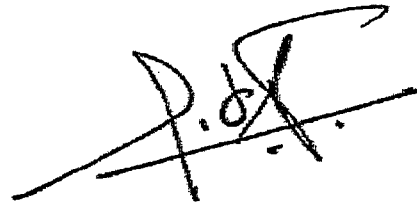
EXAMINATION BRANCH-V (SECRECY SECTION)
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CORRIGENDUM

Sl. No. of Q.P.	:	2940
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SEMESTER	:	IV
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DURATION	:	3 Hours
Maximum Marks	:	90

Announcement to be made for candidates

Unique Paper Code be read as **2342572401/ 2342202401** instead of 2342572401/ 232202401



Joint Registrar (Secrecy)