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Question Paper Code : 81166

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fourth Semester

Computer Science and Engineering

CS 3451 — INTRODUCTION TO OPERATING SYSTEMS

(Common to : Information Technology)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the different types of Operating System structures available?
2. List down the various Operating System User Interfaces.
3. How process are represented in computer and what are it's contents?
4. What are the necessary conditions for Deadlock?
5. Differentiate Segmentation and Paging.
6. What is meant by Thrashing?
7. What is Acyclic directory structure? Write down its pros and cons.
8. What are the mechanisms available to protect file sharing?
9. Compare System and Process Virtual Machines.
10. List out the key features of Mobile OS.

PART B — (5 × 13 = 65 marks)

11. (a) Analyze the different services provided by OS and list out each one of its tasks.

Or

- (b) Write down the system calls associated with OS services (write for any five services).

12. (a) Calculate Average Waiting Time for the given set of processes by applying the following CPU algorithms scheduling FCFS, SJF, SRT, PRIORITY and ROUND ROBIN (time quantum = 4).

Process	Arrival Time	Burst Time	Priority
P ₀	0	10	3
P ₁	1	1	2
P ₂	2	2	4
P ₃	3	3	5
P ₄	4	5	2

Or

- (b) Decide to satisfy the request from P1 for the resources (0, 4, 2, 1) using Banker's algorithm. Initial conditions are as follows.

	Allocation	Max	Available	Need
	A B C D	A B C D	A B C D	A B C D
P ₀	0 0 2 1	0 0 2 1	1 6 3 2	????
P ₁	1 0 0 0	1 7 5 0		
P ₂	1 3 4 3	2 3 5 6		
P ₃	0 6 5 3	0 6 5 3		
P ₄	0 0 1 4	0 6 5 6		

13. (a) Apply FIFO, Optimal and LRU page replacement techniques for the following page references using 4 page frames?

9, 0, 2, 5, 6, 7, 9, 0, 7, 5, 2, 3, 5, 6

Or

- (b) Explain how different kinds of LRU approximation are applied with example.

14. (a) Exhibit FCFS, SSTF, Scan, C-Scan, F-Scan, NStep Scan, Look, C-Look scheduling techniques for the following cylinder request 22, 67, 33, 90, 76, 8, 54. Initially the disk head position at 60?

Or

- (b) Exemplify the different file allocation methods with necessary diagrams and analyze their advantages and disadvantages.
15. (a) Explain the different types of virtual machines and their implementation with necessary diagrams.

Or

- (b) Compare IOS and Android in all aspects.

PART C — (1 × 15 = 15 marks)

16. (a) Given memory partitions of 110 K, 350 K, 500 K, 200 K, and 625 K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 152 K, 408 K, 108 K, and 400 K (in order)? Which algorithm makes the most efficient use of memory?

Or

- (b) Consider the segment table :

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical address for the following logical addresses (Segment ID, Segment Offset) :

- (i) 0,430
- (ii) 1,10
- (iii) 1,11
- (iv) 2,500
- (v) 3,500

