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Question Paper Code	12429
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Fourth Semester

Computer Science and Engineering

(Common to Information Technology, M.Tech - Computer Science and Engineering & Third Semester - Artificial Intelligence and Data Science)

20CSPC401 - OPERATING SYSTEMS

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART-A (10 × 2 = 20 Marks)

Answer ALL Questions

*Marks,
K-Level, CO*

- 1. What is an operating system? *2,K1,CO1*
- 2. What is the purpose of system calls? *2,K1,CO1*
- 3. Draw the process state diagram and explain its states. *2,K2,CO2*
- 4. Differentiate preemptive and non-preemptive scheduling. *2,K2,CO2*
- 5. Why the page size is always a power of two? *2,K2,CO3*
- 6. Define thrashing. Give an example. *2,K1,CO3*
- 7. What are the various disk scheduling algorithms? *2,K2,CO4*
- 8. List the various file attributes. *2,K1,CO4*
- 9. What is inter-process communication? *2,K1,CO5*
- 10. List and draw the layers of android OS. *2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- 11. a) (i) Explain cache memory and its mapping. *7,K2,CO1*
(ii) Discuss in detail about direct memory access. *6,K2,CO1*

OR

- b) Explain in detail the operating system structure and operations. *13,K2,CO1*
- 12. a) Consider the following CPU processes with arrival time (in milliseconds) and burst time (in milliseconds) as given below. *13,K2,CO2*

Process	Arrival Time (AT)	Burst Time (BT)
P1	0	8
P2	0	4
P3	0	9
P4	0	5

Analyze the average waiting time and average turnaround time by using first come first serve and shortest job first scheduling algorithms.

OR

- b) Explain how a critical section avoids race condition and describe a solution to the Dining-Philosopher problem. *13,K2,CO2*

13. a) Given the memory partitions of 100 kb, 50 kb, 30 kb, 120 kb and 35 kb (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 40 kb, 10 kb, 30 kb and 60 kb (in order). Analyze the algorithm that makes the most efficient use of memory. *13,K2, CO3*

OR

- b) Consider the virtual page reference string; 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 4, 0, 1. *13,K2, CO3*

On a demand paged virtual memory system running on a computer system that main memory size of 4 pages frames which are initially empty.

Let FIFO, OPTIMAL and LRU denote the number of page faults under the corresponding page replacements policy.

Choose the best algorithm by comparing FIFO, OPTIMAL and LRU algorithms.

14. a) Explain the various directory structures with a neat diagram. *13,K2, CO4*

OR

- b) Illustrate the various file allocation methods with a neat diagram. *13,K2, CO4*

15. a) Summarize the components and kernel modules of LINUX operating system. *13,K2, CO6*

OR

- b) Discuss iOS architecture and SDK framework in detail. *13,K2, CO6*

PART - C (1 × 15 = 15 Marks)

16. a) A disk has 100 tracks. The requests to access the cylinders occur in following sequence: *15,K3,CO5*

4, 34, 10, 57, 92, 73, 85, 65, 46, 20

If the current head position is at 50 and the head is moving towards the left side.

Analyze the total head movement using FCFS, SSTF, SCAN, C-SCAN and LOOK.

OR

- b) Assume that there are 5 processes, P1 through P5, and 4 types of resources. At T0 we have the following system state: 15.K3,CO5

Instances of Resource Type A = 3
 Instances of Resource Type B = 17
 Instances of Resource Type C = 16
 Instances of Resource Type D = 12

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₁	0	1	1	0	0	2	1	0	1	5	2	0
P ₂	1	2	3	1	1	6	5	2				
P ₃	1	3	6	5	2	3	6	6				
P ₄	0	6	3	2	0	6	5	2				
P ₅	0	0	1	4	0	6	5	6				

Analyse the system is in a safe state or not by using safety algorithm.