Reg. No.															

Question Paper Code	13561

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Fourth Semester

Computer Science and Business Systems

20CBPC403 - OPERATING SYSTEMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Select a system call for creating a new process. (a) getpid( ) (b) fork( ) (c) newprocess( ) (d) create( )	1	K1	CO1
2.	Exception handling interrupt will occur when an (a) instruction executes divide by 1 (b) instruction executes divide by 0 (c) instruction executes a system call (d) all of the above.	1	K1	CO1
3.	The interval from the time of submission of a process to the time of completion is termed as (a) waiting time (b) turnaround time (c) response time (d) throughput	1	K1	CO2
4.	Which system call can be used by a parent process to determine the termination of child process? (a) wait( ) (b) exit( ) (c) fork( ) (d) get( )	1	K1	CO2
5.	What is the primary purpose of a precedence graph? (a) To manage deadlocks in processes (b) To represent process dependencies (c) To synchronize critical sections (d) To implement message passing	1	K1	CO3
6.	In the Producer-Consumer problem, what does the producer do? (a) Wait for space in the buffer (b) Consume items from the buffer (c) Produce items and place them in the buffer (d) Check for deadlocks	1	K1	CO3
7.	In contiguous memory allocation (a) Processes are assigned to memory in continuous blocks (b) Memory is allocated in non-continuous sections (c) Virtual memory is used for execution (d) Pages are stored in different locations	1	K1	CO4
8.	Fixed partitioning leads to (a) Internal fragmentation (b) External fragmentation (c) Both internal and external fragmentation (d) No fragmentation	1	K1	CO4
9.	A directory structure is used to (a) Organize files in a hierarchical or linear format (b) Store files in registers (c) Delete files permanently from memory (d) Convert logical addresses to physical addresses	1	K1	CO5
10.	The First-Come, First-Served (FCFS) disk scheduling algorithm (a) Services requests in the order they arrive (b) Always gives the shortest seek time (c) Works in a circular order (d) Moves the disk arm to the nearest request	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	State the Operating System Services.	2	K1	CO1
12.	List down the five major categories of system calls.	2	K1	CO1
13.	What is meant by the bootstrap program?	2	K1	CO1

14.	Compare and contrast scheduler and dispatcher.	*2*	*K2*	*CO2*
15.	What is PCB? Specify the information maintained in it.	*2*	*K1*	*CO2*
16.	What is convoy effect?	*2*	*K1*	*CO2*
17.	What are the necessary conditions for deadlock to occur?	*2*	*K1*	*CO3*
18.	State the three states of the philosophers in dining philosopher problem.	*2*	*K1*	*CO3*
19.	Illustrate the use of Compaction.	*2*	*K2*	*CO4*
20.	Define Belady's anomaly.	*2*	*K2*	*CO4*
21.	Classify the operations that can be performed on a Directory.	*2*	*K1*	*CO5*
22.	Compare and contrast various disk scheduling algorithms.	*2*	*K2*	*CO5*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Explain in detail about various generations of operating systems and any UNIX operating system commands. *11 K2 CO1*

OR

b) (i) Explain the different operating system structures with a neat diagram. *6 K2 CO1*

(ii) Write a C program to create one parent process and child process and print process id using necessary system calls. *5 K2 CO1*

24. a) Solve the problem given below using FCFS, SJF CPU Scheduling algorithm and explain the scheduling criteria. *11 K3 CO2*

Process Name	Burst Time (Secs)
P1	24
P2	3
P3	5
P4	6

OR

b) The following processes are being scheduled using a preemptive, priority-based, round-robin scheduling algorithm. *11 K3 CO2*

Process	Priority	Burst Time	Arrival Time
P1	8	15	0
P2	3	20	0
P3	4	20	20
P4	4	20	25
P5	5	5	45
P6	5	15	55

Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. The scheduler will execute the highest priority process. For processes with the same priority, a round-robin scheduler will be used with a time quantum of 10 units. If a process is preempted by a higher-priority process, the preempted process is placed at the end of the queue.

(a) Show the scheduling order of the processes using a Gantt chart.

(b) What is the turnaround time for each process?

(c) What is the waiting time for each process?

25. a) Demonstrate a Producer Consumer problem in real life and provide a solution using semaphore. *11 K2 CO3*

OR

	b)	Explain the dining philosopher's critical section problem solution using monitor and write the algorithm using test and set instruction that satisfy all the critical section requirements.	*11*	*K2*	*CO3*
26.	a)	Explain the following memory allocation techniques with an example. (i) First fit (ii) Best fit (iii) Worst fit	*11*	*K2*	*CO4*
		OR			
	b)	Summarize the total number of page faults using the following page replacement algorithm for the given string. (i) LRU (ii) FIFO String : 7 0 3 4 5 1 0 2 0 3 4 5 0 1 Page frame size : 4	*11*	*K2*	*CO4*
27.	a)	Explain different Disk scheduling algorithms SCAN, CSCAN, CLOOK.	*11*	*K2*	*CO5*
		OR			
	b)	Summarize briefly about file attributes, operations, types and structure.	*11*	*K2*	*CO5*
28.	a) (i)	Explain how paging supports virtual memory. With a neat diagram explain how logical address is translated into physical address.	*6*	*K2*	*CO4*
	(ii)	Explain the following with appropriate diagrams: (a) Two level directory structure. (b) Acyclic-graph directory structure	*5*	*K2*	*CO5*
		OR			
	b) (i)	Compare and contrast internal fragmentation and external fragmentation in memory management and state the solution for the above problem.	*6*	*K2*	*CO4*
	(ii)	Explain any two disk space allocation methods.	*5*	*K2*	*CO5*