PVP 23

Code: 23CS3401, 23IT3401

II B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2026

OPERATING SYSTEMS

(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define an operating system from the user view and system view.	L2	CO1
1.b)	List any four operating system services.	L2	CO1
1.c)	What is a process? How is it different from a program?	L2	CO1
1.d)	What is a Process Control Block (PCB)? Mention any two fields stored in it.	L2	CO1
1.e)	What is the critical-section problem? State its requirements.	L2	CO1
1.f)	Define mutex lock. How is it different from a semaphore?	L2	CO1
1.g)	What is address binding? Name its different types.	L2	CO1
1.h)	Define paging. What is a page frame?	L2	CO1
1.i)	What is a file? List any two file attributes.	L2	CO1
1.j)	Define sequential access and direct access methods.	L2	CO1

PART – B

<table>
<tr><th></th><th></th><th></th><th>BL</th><th>CO</th><th>Max. Marks</th></tr>
<tr><td colspan="6">UNIT-I</td></tr>
<tr><td rowspan="2">2</td><td>a)</td><td>Explain what operating systems do from user view and system view with examples.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td>b)</td><td>Explain operating system services and illustrate them with a neat diagram.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">3</td><td>a)</td><td>Describe the major functions of an operating system, including process, memory, storage, and protection management.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td>b)</td><td>Discuss different computing environments supported by operating systems with examples.</td><td>L2</td><td>CO1</td><td>5 M</td></tr>
<tr><td colspan="6">UNIT-II</td></tr>
<tr><td>4</td><td colspan="2">Given the following processes and arrival times:
<table>
<tr><th>Process</th><th>Arrival time(ms)</th><th>Burst time(ms)</th></tr>
<tr><td>P1</td><td>0</td><td>7</td></tr>
<tr><td>P2</td><td>2</td><td>4</td></tr>
<tr><td>P3</td><td>4</td><td>1</td></tr>
<tr><td>P4</td><td>5</td><td>4</td></tr>
</table>
a) Construct Gantt charts for
i) FCFS
ii) Pre-emptive SJF (Shortest Remaining Time First)
iii) Round Robin (quantum = 2)
b) Calculate waiting time and turnaround time for each algorithm.
c) Which scheduling algorithm gives best average turnaround time? Justify.</td><td>L4</td><td>CO4</td><td>10 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>5</td><td colspan="2">The following processes are given</td><td>L3</td><td>CO2</td><td>10 M</td></tr>
</table>

		<table><tr><th>Process</th><th>Arrival Time (ms)</th><th>Burst Time (ms)</th></tr><tr><td>P1</td><td>0</td><td>12</td></tr><tr><td>P2</td><td>1</td><td>5</td></tr><tr><td>P3</td><td>2</td><td>9</td></tr><tr><td>P4</td><td>3</td><td>4</td></tr></table> Apply FCFS, SJF (non-preemptive), and Round Robin (time quantum = 3 ms) scheduling algorithms. i)Draw the Gantt chart for each algorithm. ii)Calculate turnaround time for each process. iii) Calculate waiting time for each process. iv)Which algorithm gives minimum average waiting time?			
UNIT-III					
6	a)	Explain Peterson's solution to the critical-section problem with a suitable example.	L2	CO3	5 M
	b)	Explain Banker's algorithm for deadlock avoidance with a suitable example.	L2	CO3	5 M
OR					
7	a)	Describe semaphores and their usage. Explain how semaphores can be used to solve producer-consumer synchronization problem.	L3	CO3	5 M
	b)	Explain how semaphores are used to solve readers–writers problem.	L3	CO3	5 M
UNIT-IV					
8	a)	Apply FIFO and Optimal page replacement algorithms to the following page reference string with three frames: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 Calculate the number of page faults and identify which algorithm performs better.	L3	CO4	5 M
	b)	Consider the disk request queue: 176, 79, 34, 60, 92, 11, 41, 114 Initial head position = 50	L3	CO4	5 M

		Disk cylinder range = 0–199 The disk head is initially moving toward higher-numbered cylinders. Compute the total head movement for the following disk scheduling algorithms: i)SCAN ii) C-SCAN			
OR					
9	a)	Consider the page reference string below with four frames: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5 Apply LRU and FIFO page replacement algorithms and compute page faults. Compare results.	L3	CO4	5 M
	b)	Given five processes and 20 available frames, allocate frames using: i) Equal allocation ii) Proportional allocation Process sizes (pages): P1=10, P2=20, P3=30, P4=25, P5=15. Determine number of frames assigned to each process.	L4	CO4	5 M
UNIT-V					
10	a)	Explain the file concept in operating systems. Describe file attributes, file operations, and file types with examples.	L2	CO1	5 M
	b)	Explain free space management techniques in file systems. Compare bit vector and linked list methods.	L2	CO1	5 M
OR					
11	a)	Discuss different directory structures used in file systems. Compare single-level, two-level, and tree-structured directories.	L2	CO1	5 M
	b)	Explain protection mechanisms in operating systems. Describe protection goals, protection domains, and access matrix with an example.	L2	CO1	5 M