Code: 23CS3401 **PVP 23**

II BTech – II Semester – Regular / Supplementary Examinations

APRIL 2026

OPERATING SYSTEMS

(COMPUTER SCIENCE & ENGINEERING)

Max. Marks: 70

SHORT SCHEME OF EVALUATION

PART-A

1.a) Define Operating System from the user view and system view. 2M

- Userview-1M
- Systemview-1M

1.b) List any four operating system services. 2M

- Any four services-2M

1.c) What is a process? How is it different from a program? 2M

- Definition of process-1M
- Difference between process and program-1M

1.d) what is a process control block mention any two fields stored in it? 2M

- Definition of PCB – 1M
- Any two fields – 1M

1.e) what is a critical section problem? State its requirements. 2M

- Defining critical section problem – 1M
- Requirements-1M

1.f) Define Mutex Lock. How is it different from a semaphore? 2M

- Definition – 1M
- Difference from semaphore-1M

1.g) What is address binding? Name its different types. 2M

- Definition – 1M
- Types-1M

1.h) Define Paging.What is a page frame? 2M

- Definition of paging– 1M
- Definition of page frame -1M

1.i) what is a file? List any two attributes. 2M

- Definition of file– 1M
- List of two attributes -1M

1.j) Define Sequential access and direct access methods. 2M

- Definition of Sequential access – 1M
- Definition of direct access -1M

PART B

UNIT I

2a) Explain what operating systems do from user view ans system view with examples. 5M

- Explanation of userview responsibilities – 3M
- System view-2M

2b) Explain operating system services and illustrate them with neat diagram. 5M

- Diagram-1M
- Any four services explanation-4M

3a) Describe major functions of an operating system including process,memory,storage and protection management. 5M

- Process management-1M
- Memory management-1M
- Storage management -2M
- Protection management-1M

3b) Discuss different computing environments supported by operating systems with examples. 5M

- Traditional computing – 1M
- Mobile computing – 1M
- Client-server computing – 1M
- Peer-to-peer computing – 1M
- Cloud computing – 1M

UNIT II

Q4) Given the following processes and arrival times: 5M

Process	Arrival time (ms)	Burst time (ms)
P1	0	7
P2	2	4
P3	4	1
P4	5	4

a) Construct Gantt charts for:

i) FCFS **1M**

ii) Pre-emptive SJF (Shortest Remaining Time First) **1M**

iii) Round Robin (quantum = 2) **1M**

b) Calculate waiting time and turnaround time for each algorithm. **1M**

c) Which scheduling algorithm gives best average turnaround time? Justify. **1M**

Q5) The following processes are given **5M**

Process | Arrival Time (ms) | Burst Time (ms)

P1 | 0 | 12
P2 | 1 | 5
P3 | 2 | 9
P4 | 3 | 4

Apply FCFS, SJF (non-preemptive), and Round Robin (time quantum = 3 ms) scheduling algorithms.

i) Draw the Gantt chart for each algorithm. **1M(FCFS) +1M(SJF)+1M (RR)**

ii) Calculate turnaround time for each process. **0.5M**

iii) Calculate waiting time for each process. **0.5M**

iv) Which algorithm gives minimum average waiting time? **1M**

UNIT III

Q6 (a) Explain Peterson's solution to the critical section problem with a suitable example. **5M**

- Peterson's solution-3M
- Example-2M

Q6 (b) Explain Banker's Algorithm for deadlock avoidance with a suitable example. 5M

- Banker's algorithm-3M
- Example-2M

Q7 (a) Describe Semaphores and their usage. Explain how semaphores are used to solve Producer-Consumer synchronization problem. 5M

- Description of semaphores and usage- 2M
- Producer-consumer problem-1M
- Solution using semaphores-2M

Q7(b) Explain how semaphores are used to solve Readers-Writers problem. 5M

- Readers-writers problem – 2M
- Solution using semaphores -3M

UNIT IV

8a) Apply FIFO and Optimal Page Replacement algorithms to the following page reference string with three frames: 5M
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.

- FIFO-2M
- OPTIMAL-2.5M
- CONCLUSION-0.5M

8b) Consider the disk request queue: 176, 79, 34, 60, 92, 11, 41, 114
Initial head position = 50 Disk cylinder range = 0-199
The disk head is initially moved toward high-numbered cylinders. Compute the total head movement for the following disk scheduling algorithms 5M

i) SCAN --2.5M ii) C-SCAN -- 2.5M

9a) 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. 5M

- LRU -2.5M
- FIFO-2M
- Results comparision-0.5M

9b) 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 assigned to each process. 5M

- Equal Allocation- 2.5M
- Proportional allocation-2.5M

UNIT-V

10 a) Explain the file concept in operating systems. Describe file attributes, file operations, and file types with examples 5M

- File concepts: 1M
- File attributes:1M
- File operations:2M
- File types: 1M

10 b) Explain free space management techniques in file systems. Compare bit vector and linked list methods 5M

- Free space mangement techniques: 3M
- comparision:2M

11 a) Discuss different directory structures used in file systems. Compare single-level, two-level, and tree-structured directories. 5M

- Listing of types: 1M
- Explanation of types:2M
- Comparision:2M

11 b) Explain protection mechanisms in operating systems. Describe protection goals, protection domains, and access matrix with an example 5M

- Protection mechanisms-1M
- Goals of Protection -1M
- Protection Domains -1M
- The Access Matrix -1M
- Example of an Access Matrix -1M