



R22 Regulation

Subject code: 4E5EB & 4E5GB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Regular/Supplementary Examinations, November 2025

OPERATING SYSTEMS
(Common to CSE & CSE(AI&ML))

Maximum Marks: 60

Date: 20.11.2025

Duration: 3 hours

- Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Distinguish between multiprogramming and multitasking?	1M	1	L1
b)	What is the main function of an OS?	1M	1	L1
c)	What is a PCB (Process Control Block)?	1M	2	L1
d)	What is context switching?	1M	2	L1
e)	Define semaphore.	1M	3	L2
f)	What is a critical section?	1M	3	L1
g)	Define paging.	1M	4	L2
h)	What is thrashing?	1M	4	L1
i)	What is the importance of seek ()?	1M	5	L1
j)	List any two system calls for file handling	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Explain various system calls for process management. b) Discuss the major functions and services provided by an operating system in detail.	5M 5M	1	L2
OR				
3	a) Explain briefly about virtual machines and micro Kernels. b) Describe the different components of computer system architecture.	5M 5M	1	L2
4	a) What resources are used when a thread is created? How do they differ from those used when a process is created? b) Consider 4 processes P1 to P4 with arrival time 0,1,2,4 and burst time is 5,4,2,1 respectively. Consider Time quantum =2 ms . Draw the Gantt chart, Compute Completion time, Waiting time, Turnaround time and Average waiting time for each process.	4M 6M	2	L3
OR				
5	Following is the snapshot of a CPU. Process CPU Burst Arrival Time P1 10 0	10M	2	L2

	P2 29 1 P3 03 2 P4 07 3 Draw the Gantt chart and calculate the turnaround time and waiting time of the jobs for FCFS (First Come First Served), SJF (Shortest Job First), SRTF (Shortest Remaining Time First) and RR (Round Robin with time quantum 10) scheduling algorithms.																															
6	Explain the critical section problem and Peterson's solution. OR	10M	3	L2																												
7	Illustrate Banker's Algorithm for deadlock avoidance with suitable example.	10M	3	L4																												
8	a) Consider the page reference string: 1 2 3 4 1 3 0 1 2 4 1 and 3 page frames. Find the page faults, hit ratio and miss ratio using FIFO, optimal page replacement and LRU schemes. b) Explain briefly about optimal Page replacement algorithm.	5M 5M	4	L2																												
	OR																															
9	a) Consider the following page reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 Determine how many page faults would occur for Optimal page replacement algorithm. Assume three frames are initially empty. b) Explain briefly about LRU Page replacement algorithm.	5M 5M	4	L3																												
10	Consider the following snapshot of a system: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Processes</th> <th>Allocation</th> <th>Max</th> <th>Available</th> </tr> <tr> <td></td> <td>ABCD</td> <td>ABCD</td> <td>ABCD</td> </tr> </thead> <tbody> <tr> <td>P0</td> <td>0012</td> <td>0012</td> <td>1520</td> </tr> <tr> <td>P1</td> <td>1000</td> <td>1750</td> <td></td> </tr> <tr> <td>P2</td> <td>1354</td> <td>2356</td> <td></td> </tr> <tr> <td>P3</td> <td>0632</td> <td>0652</td> <td></td> </tr> <tr> <td>P4</td> <td>0014</td> <td>0656</td> <td></td> </tr> </tbody> </table> Answer the following questions using the banker's algorithm: a) What is the content of the matrix Need? b) Is the system in a safe state? c) If a request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately?	Processes	Allocation	Max	Available		ABCD	ABCD	ABCD	P0	0012	0012	1520	P1	1000	1750		P2	1354	2356		P3	0632	0652		P4	0014	0656		3M 3M 4M	5	L2
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11	a) Explain about the free space management. b) Consider the following disk queue with requests for I/O to blocks on cylinders 98,183,37,122,14,124,65,67 in that order, using FCFS, SCAN algorithms of the disk head is initially at cylinder 53, find the total head movement in cylinders. Also provide the necessary diagram to show the head movement for the above queue.	6M 4M	5	L3																												