

B. Tech. 4th Semester
MID-SEMESTER EXAMINATION, February-2024
 Course Title: Operating Systems
 Course Code: COCSC09/CACSC09/CDCSC09/CMCSC09

Duration: 1:30 Hours

Max. Marks: 15

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO															
1a	Describe the following i. Multiprogramming OS ii. Real time OS iii. Time sharing OS iv. Distributed OS	2	CO1															
1b	Explain the significance of process control block (PCB) and its role in process context switching.	1	CO2															
2a	Illustrate the procedure of system call to transfer the content of file A to file B using a neat diagram.	2	CO2															
2b	Identify from the following instructions that should be run in the privileged mode (Kernel mode)? i. Set value of timer ii. Read the clock iii. Clear memory iv. Issue a trap instruction v. Turn off interrupts. vi. Modify entries in device-status table vii. Switch from user to kernel mode viii. Access I/O device.	1	CO1															
3a	Consider the following four processes to run in a single CPU. What is the absolute difference between the <u>average waiting time</u> and the <u>average turnaround time</u> when scheduling these processes according to Preemptive SJF (SRTF) and RR (time quanta 2 ms)?	2	CO2															
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Process ID</th> <th style="width: 25%;">Arrival Time</th> <th style="width: 25%;">Burst Time</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">P1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: center;">P2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">P3</td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">P4</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> </tr> </tbody> </table>				Process ID	Arrival Time	Burst Time	P1	0	8	P2	3	3	P3	5	4	P4	6	6
Process ID	Arrival Time	Burst Time																
P1	0	8																
P2	3	3																
P3	5	4																
P4	6	6																

3b	<p>Which one of the following scheduling policies will provide the least turnaround time for a CPU-bound process if both I/O-bound and CPU-bound requests are present in the system? Justify your answer.</p> <p>(i) Round Robin (RR) Scheduling, (ii) Longest Job first (LJF preemptive) Scheduling</p>	1	CO2
4a	<p>Consider a given scenario where we have processes P1,P2,P3, P4,...., P10.</p> <p>a) P1, P2, and P3 are completed successfully. b) CPU is executing the P4 process. c) P5 is waiting for Input output resources. d) Rest all in the main memory.</p> <p>Draw and explain a process state life cycle model? Also, depict which process (i.e., P1, P2, P3, P4,....,P10) will be their respective process state and under which scheduler?</p> <p>Note: Only a diagram is needed with proper labelling.</p>	2	CO2
4b	<p>Illustrate the total number of processes after the complete execution of the below program.</p> <pre>#include <stdio.h> #include <unistd.h> int main() { if (fork() fork()) fork(); printf("1 "); return 0; }</pre>	1	CO2
5a	<p>Define a critical section problem by taking a suitable example. Specify the requirements to be satisfied by the solution to the critical section problem.</p>	2	CO2
5b	<p>Describe the differences between the process and thread creation, and justify why the threads are considered as lightweight processes?</p>	1	CO1