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 average waiting time and the average turnaround time when scheduling these processes according to Preemptive SJF (SRTF) and RR (time quanta 2 ms)?	2	CO2

Process ID	Arrival Time	Burst Time
P1	0	8
P2	3	3
P3	5	4
P4	6	6

3b	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. (i) Round Robin (RR) Scheduling, (ii) Longest Job first (LJF preemptive) Scheduling	1	CO2	
4a	Consider a given scenario where we have processes P1,P2,P3, P4,..., P10. 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. 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? Note: Only a diagram is needed with proper labelling.	2	CO2	
4b	Illustrate the total number of processes after the complete execution of the below program. ```c\n#include <stdio.h>\n#include <unistd.h>\nint main()\n{\n\n if (fork() || fork())\n fork();\n printf("1 ");\n return 0;\n\n}\n```	1	CO2	
5a	Define a critical section problem by taking a suitable example. Specify the requirements to be satisfied by the solution to the critical section problem.	2	CO2	
5b	Describe the differences between the process and thread creation, and justify why the threads are considered as lightweight processes?	1	CO1	