

National Institute of Technology, Kurukshetra
B.Tech (Computer Engineering) IV Semester
Mid Sem Exam-I Feb 2022
Operating Systems (CSPC-20)

Time: 50 min

MM: 15

Instructions: 1. Attempt all questions. 2. Write answers on A4 register sheets using blue pen only in your own handwriting. 3. On top of each page write Roll Number and Page Number. 4. Keep I-Card on first page for scanning. 5. Scan all pages using Adobe Scan/ClearScanner/Similar Tool and upload / hand-in / turn-in under Classwork on Google Classroom "Exams of OS (CSPC 20) Even 2022" having class code y4ipfe2 before 11:00am

1. Distinguish between CPU bound and I/O bound jobs. (1)
2. When is the long-term scheduler invoked? (1)
3. Describe the actions taken by a kernel to context-switch between processes. (1)
4. Consider a computer with a CPU scheduler that implements the RR, SJF and FCFS scheduling algorithms.
 - a. For what types of workloads does SJF deliver the same turnaround times as FIFO? (1)
 - b. For what types of workloads and quantum lengths does SJF deliver the same response times as RR? (2)
5. It is sometimes required that when two threads are running, one thread should automatically preempt the other. The preempted thread can execute only when the other has run to completion. How to implement this requirement? Explain your logic with pseudo code. (2)
6. What are differences between user level threads and kernel level threads? (1)
7. (i) What is the effect of time quanta on the performance of RR scheduling algorithm? (1)
(ii) Consider a variation of round robin scheduling, say NRR scheduling. In NRR scheduling, each process can have its own time quantum, q. The value of q starts out at 40 ms and decreases by 10 ms each time it goes through the round robin queue, until it reaches a minimum of 10 ms. What implication will it have on different types (in terms of CPU burst) of jobs in the system? (1)
8. Consider two processes, P1 and P2, where p1 = 50, t1 = 25, p2 = 55, and t2 = 40. Illustrate the scheduling of these two processes using EDF scheduling. (2)
9. a) A system has four processes and five allocatable resources. The current allocation and maximum needs are as follows:

	Allocated	Maximum	Available
Process A	1 0 2 1 1	1 1 2 1 3	0 0 x 1 1
Process B	2 0 1 1 0	2 2 2 1 0	
Process C	1 1 0 1 0	2 1 3 1 0	
Process D	1 1 1 1 0	1 1 2 2 1	

What is the smallest value of x for which this is a safe state? (1)

b) Justify how circular wait scheme can be used to prevent the deadlock. Compare the performance of circular wait scheme with Banker's algorithm in terms of runtime overhead. (2)

OR

- i. With the help of diagram describe the steps in the execution of a system call. (1)
- ii. Even the simplest system calls have a significant overhead by comparison with a user-space function call. Justify the statement. (1)
- iii. What is the purpose of fork() and exec() systems calls? (1)

THE END

Instructions: Test will be available at **9.51 am on the Google classroom**. Students are required to complete the test **within 50 min i.e. up to 10.50 am**. After that 10 mins are there to scan and prepare PDF document and to submit i.e. **up to 11.00 am** strictly.