Bachelor Level / fourth-semester / Science Full marks: 60 **Computer Science and Information Technology(CSC259)** Pass marks: 24 (Operating Systems) Time: 3 hours Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Section-A

Attempt any two questions: (2x10=20)

1. Explain "race condition" and also state how process synchronization is handled using semaphore? Explain with

        algorithms. OR

Suppose three people are in line waiting for a department store to open for "the big sale". When the door opens, all three rush the door, but the door is not big enough for all of them to pass through at once. Describe a solution for addressing this deadlock that will allow three people to pass through the door. Which of the 4 necessary deadlock conditions does your solution break? Explain

2. Consider the following page reference string 1, 3, 5,4, 7, 1, 5, 6, 1, 2, 3, 7, 6, 3, 4, 1, 3, 8. How many page faults would occur for each of the following page replacement algorithms assuming 3 frames?

   a) FIFO

   b) OPR

   c) LRU

3. Consider the following set of processes, with the length of the CPU-burst time and arrival time given in

   milliseconds. <u>Process Burst time Arrival time</u>

    P1 10 0

    P2 15 2

    P3 22 3

    P4 16 5

    P5 5 6

For the given data, draw Gantt charts that illustrate the execution of these processes using SJF and Robin algorithms with quantum 4 milliseconds.

Section-B

Attempt any eight questions: (8x5=20)

4. Do you think a process can exist without any state? Justify your view with the help of a process state transition diagram.

5. Suppose that a disk drive has the cylinder numbered from 0 to 4999. The head is currently at cylinder number 143. The queue for cylinder services is as 86, 1470, 913, 948, 1509,1774, 1022, 1750 and 130. What is the total head movement in each of the following disk algorithms to satisfy the requests?

   a) FCFS

   b) SSTF

6. Define deadlock. How can deadlock be prevented?

7. What is the advantage of interrupt over polling? Explain the working mechanism of the interrupt controller.

8. Are there any linkages between semaphore and deadlock conditions? If yes, Explain with an example.

9. Describe the methods for implementing directories with examples.

10. What is the difference between physical address and virtual address? Explain the conversion of virtual address into physical address by MMU.

11. Differentiate between time sharing and the real time system.

12. Explain about bitmap and linked list memory management systems.