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**10CS53**

## Fifth Semester B.E. Degree Examination, July/August 2021
# Operating Systems

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions.*

1  a. What is an Operating Systems? Explain the abstract view of system components. **(08 Marks)**
   b. What is real time system? Describe two different types of real time system. **(04 Marks)**
   c. Describe the different computing environments. **(08 Marks)**

2  a. What is a process? Explain process state and PCB using diagrams. **(08 Marks)**
   b. For the following set of processes, calculate average turnaround time and average waiting time for the following algorithms:
   (i) FCFS        (ii) Preemptive SJF        (iii) Round Robin  (Time quantum = 1 ms)

   | Process | Arrival Time | Burst Time |
   |---------|--------------|------------|
   | $P_1$ | 0 | 8 |
   | $P_2$ | 1 | 4 |
   | $P_3$ | 2 | 9 |
   | $P_4$ | 3 | 5 |

   **(12 Marks)**

3  a. What is critical section problem? Explain Peterson's solution for it. **(10 Marks)**
   b. Discuss about Dining Philosopher's (DP) problem. Give the solution for DP using monitors. **(10 Marks)**

4  a. What is Deadlock? Explain the different conditions hold in a system for deadlock. **(05 Marks)**
   b. Explain Resource-Allocation-Graph algorithm for deadlock avoidance. **(05 Marks)**
   c. The OS contains 3 resources, the number of instance of each resource type are 7, 7, 10. The current resource allocation state is shown below:

   | Process | Current Allocation | | | Maximum Need | | |
   |---------|-------|-------|-------|-------|-------|-------|
   | | $R_1$ | $R_2$ | $R_3$ | $R_1$ | $R_2$ | $R_3$ |
   | $P_1$ | 2 | 2 | 3 | 3 | 6 | 8 |
   | $P_2$ | 2 | 0 | 3 | 4 | 3 | 3 |
   | $P_3$ | 1 | 2 | 4 | 3 | 4 | 4 |

   (i)    Is the current allocation in a safe state?
   (ii)   Can the request made by process P1(1, 1, 0) be immediately granted? **(10 Marks)**

5  a. Explain paging technique using diagrams. **(06 Marks)**
   b. Consider the following memory references made by a program in KBs are:
   101, 205, 302, 401, 208, 105, 503, 608, 212, 105,
   220, 301, 712, 609, 316, 250, 109, 260, 358, 650
   If the size of a page is 100 KB, how many page faults would occur for the following page replacement algorithms: (i) LRU     (ii) FIFO     (iii) Optimal **(10 Marks)**
   c. What do you mean by Thrashing? Briefly explain the different causes of thrashing. **(04 Marks)**

6 a. Discuss about the different file access methods. (06 Marks)
   b. What is directory? Describe the General graph directory structure. (04 Marks)
   c. Explain the Indexed allocation of files in disk space. (05 Marks)
   d. Describe the different Free-Space management techniques in a disk. (05 Marks)

7 a. Explain the different Disk scheduling algorithms with example. (10 Marks)
   b. Discuss with neat sketch diagram about access matrix protection model. (10 Marks)

8 a. Explain the different components of a Linux system. (06 Marks)
   b. Discuss about process scheduling in Linux system. (06 Marks)
   c. Explain the management of physical memory in Linux system. (08 Marks)

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