

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (COMPUTER SCIENCE AND ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2019

SUBJECT: OPERATING SYSTEMS [CSE 3102]

REVISED CREDIT SYSTEM (25/11/2019)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- 1A. With the help of neat diagram, explain different states of a process. Mention the role of Process 5M Control Block along with all the pieces of information that it stores related to the process.
- **1B.** Explain the role of Java virtual Machine along with its implementation mechanism. **3M**
- **1C.** Mention any 3 responsibilities of operating system with respect to each of the following **2M**
 - (i) Storage management
 - (ii) Memory management
- 2A. With the help of a Gantt Chart for the following data shown in Table 2A, calculate Average 5M Waiting Time and Turnaround time for preemptive SJF and round robin. Assume the time quantum to be 2ms.

Table 2A.

Process	Arrival Time	Burst Time
P1	0	8
P2	4	5
P3	3	2
P4	2	1

2B. Explain the many-to-one and one-to-one threading models with diagrams. Why is multithreaded **3M** programming preferred than multiprogramming?

- **2C.** Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests, in FIFO order, is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for LOOK (initially moving from lower to higher values) algorithm?
- **3A** Consider the resource allocation graph in the Fig. 3A



Find if the system is in a deadlock state otherwise find a safe sequence using Banker's algorithm. **5M**

- **3B.** Describe with the pseudo-code, how the Petersons Solution that addresses all the issues related to **3M** the critical section problem.
- **3C.** Give the general structure for the code segment of a reader process.
- 4A. For the given reference string, determine which page replacement algorithm (FIFO, LRU) suits better, having to consider frame size to be 3 and 4 for each respectively. Justify your answer with proper reason and clear working of the same. Reference String: 2 3 4 5 2 3 6 2 3 4 5 6
- **4B.** Design a Paging architecture diagram with a two-level paging scheme for 2-KB pages with 16-bit linear address as shown Table 4B below.

page number		page offset
p1	p2	d
5	5	6

Table 4B.

The page size could be either 2 KB or 2 MB. The 5 high-order bits (p1) reference an entry in the outermost page table (called page directory) and BR register points to it for the current process. Page directory entry points to an inner page table indexed by inner most 5 bits (p2) of linear address. The low order bits 0-5 refer to offset in the 2-KB page pointed to in the page table. A page-size flag determines the size of the page frame, which is 2 MB if set and the page directory pointing to 2-MB frame bypassing the inner page table; the 11 low-order bits in the linear address refer to the offset in the 2-MB page frame. Label the blocks, show the edges and number the bits appropriately for the linear address shown above.

4C. Explain each allocation algorithms that don't consider process priority for the below case. P1 requires 15KB, P2 requires 45KB and P3 requires 75KB in a system with 1-KB frame size and total available frames are 126. Justify which one suits better with clear reason.

5A. Write a short note on

- (i) Tree-Structured directories
- (ii) Acyclic Graph directory
- **5B.** Discuss the strengths and weaknesses of implementing an access matrix using access lists that are **3M** associated with objects.
- **5C** Explain the Linux Scheduler and the relationship between priority of tasks and their time-quanta. **3M**

4M

3M

4M

2M