K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)
Semester: **August-November 2021**
In-Semester Examination

Class: SY/TY/LY B. Tech
Branch: **Semester:**
Full name of the course: **Course Code:**
Duration: 1hr.15 min (attempting questions) **Max. Marks: 30**
+15 min (uploading)

Q. No	Questions	Marks
Q1	1.1) Consider the following statements about user level threads and kernel level threads. Which one of the following statement is FALSE? (A) Context switch time is longer for kernel level threads than for user level threads. (B) User level threads do not need any hardware support. (C) Related kernel level threads can be scheduled on different processors in a multi-processor system. (D) Blocking one kernel level thread blocks all related threads.	1
	1.2) A process executes the following code for (i = 0; i <5 ; i++) fork( ); The total number of child processes created are (A)63 (B)15 (C)31 (D)32	1
	1.3) At a particular time of computation, the value of a counting semaphore is 7. Then 10 V operations and "x" P operations were performed on this semaphore. If the final value of semaphore is 9, x will be: (A) 9 (B) 8 (C) 10 (D) 11	1
	1.4) Which of the following statement is False? (A) Multitasking involves concepts of both context switching and timesharing (B) Multiprogramming involves concepts of both context switching and timesharing (C) Multiprogramming increases CPU utilization (D) Multitasking increases CPU utilization and responsiveness	1

	1.5) Which of the following is False? (A) In Asymmetric Multiprocessing, the processes are not treated equally (B) In Symmetric Multiprocessing, the processes are treated equally (C) In Asymmetric Multiprocessing, the task of the operating system are done by the master processor (D)) In Asymmetric Multiprocessing, the kernel thread can run on each processor	1
	1.6) Select the service of the operating system not to assist users: (A) Error Detection (B) Program executions (C) I/O operations (D) Resource Allocation	1
	1.7) Which of the following operating system structures uses Top-down approach? (A) Modular Approach (B) Layered Structures (C) MicroKernel (D) Simple Structures	1
	1.8) Which of the following is not true? (A) Process can never switch from new to running state. (B) Process always switch to waiting state before entering in ready state after running state (C) Process can directly go to terminated state from running state (D) Process can directly go to terminated state from waiting state	1
	1.9) Which of the following scheduling algorithms not suffers from starvation? (A) Preemptive Round Robin Scheduling algorithm (B) Preemptive Priority algorithm (C) Non-Preemptive Priority algorithm (D) Non-Preemptive Shortest Job First algorithm	1
	1.10) The situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the order of execution (A) Critical Section (B) Cooperating Process (C) Race Condition (D) Semaphore	1

<table>
<tr><td>Q2 a)</td><td>Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems?</td><td>5</td></tr>
<tr><td>Q2 b)</td><td>Consider a system running ten I/O-bound tasks and one CPU-bound task. Assume that the I/O-bound tasks issue an I/O operation once for every millisecond of CPU computing and that each I/0 operation takes 10 milliseconds to complete. Also assume that the context-switching overhead is 0.1 millisecond and that all processes are long-running tasks. Describe the CPU utilization for a round-robin scheduler when:
a. The time quantum is 1 millisecond
b. The time quantum is 10 milliseconds

OR

Explain PCB. How Thread is different than Process?</td><td>5</td></tr>
<tr><td>Q3 a)</td><td>Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned.

Method Used by P1
while (S1 == S2) ;
Critica1 Section
S1 = S2;

Method Used by P2
while (S1 != S2) ;
Critica1 Section
S2 = not (S1);

With Respect to The Critical Section Problem, Examine the above code for Mutual Exclusion and Progress Requirements.</td><td>5</td></tr>
<tr><td>Q3 b)</td><td>Consider a set of 4 processes whose arrival time, CPU time needed are given below:

<table><tr><th>Process</th><th>Arrival Time</th><th>Burst Time</th><th>Priority</th></tr><tr><td>P1</td><td>0</td><td>8</td><td>3</td></tr><tr><td>P2</td><td>1</td><td>2</td><td>4</td></tr><tr><td>P3</td><td>3</td><td>4</td><td>4</td></tr><tr><td>P4</td><td>4</td><td>1</td><td>5</td></tr><tr><td>P5</td><td>5</td><td>6</td><td>2</td></tr><tr><td>P6</td><td>6</td><td>5</td><td>6</td></tr><tr><td>P7</td><td>10</td><td>1</td><td>1</td></tr></table>
If Pre-emptive Priority Scheduling algorithm is applied, Calculate the waiting time, turnaround time for each process. Illustrate the scheduling policy with the help of Gantt chart.</td><td>5</td></tr>
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	OR Consider five CPU intensive processes, which require 1,5,1,6,3 units and arrive at times 2,1,4,0,2 respectively. Illustrate the scheduling policy with the help of Gantt chart. How many context switches are needed if Shortest Remaining Time First is implemented? Context switch at 0 is included but context switch at end is ignored. Also, Calculate the waiting time for each process.	