OS Midterm Exam, 26th, April 2021 Spring

1. What is an Operating System? And describe 5 main management components of an Operating System. (5 points)

2. What are the meanings of "user mode" And "kernel mode" in OS? and describe how to access to kernel mode from user mode. (5 points)

3. What is the difference between Thread and Process? What are the advantages of using multithreading? (10 points)

4. Describe the operation of interrupt in details. (10 points)

5. What is Inter-Process Communication (IPC)? And describe detail of the method of IPC. (10 points)

6. Consider the following set of processes, with the length of the CPU burst given in milliseconds. You have to show the GANTT chart for Preemtive Shortest Job First Scheduling and calculate an average waiting time (15 points)

	Burst Time	*Arrival Time*
P1	*3*	*0*
P2	*7*	*2*
P3	*1*	*3*
P4	*4*	*5*

7. What is the critical-section problem? describe the detailed condition and solution for critical section. (10 Points)

8. Describe whether the following software solution to guarantee mutual exclusion is correct or not. If not, please explain why it is incorrect? (15 Points)

```
Var flag: Array[0..1] of Boolean;
    turn:= i, j;

Repeat                                  Repeat
  flag[i] := true;                        flag[j] := true;
  turn := j;                              turn := i;
  While(flag[i] AND turn=j) Do SKIP;      While(flag[j] AND turn=i) Do SKIP;
        Critical Section                        Critical Section
  flag[i] := false;                       flag[j] := false;
        Remainder Section                       Remainder Section
Until False                             Until False
```

9. Describe why Mutual Exclusion is needed in concurrent program environment. You have to show example. (10 points)

10. Describe detailed the semaphore operation of synchronization methods. (10 points)