National University of Computer & Emerging Sciences, Karachi
Spring-2019 CS-Department
MidTerm 1
25th February 2019, 9:00 am – 10:00 am

Course Code: CS205	Course Name: Operating Systems
Instructor Name / Names: Dr. Hasina Khatoon, Nausheen Shoaib, and Tania Iram	
Student Roll No:	Section No:

Instructions:

- Read each question completely before answering it. There are **3 questions on 2 pages**.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- All the answers must be solved, such that, the entire question is in one sequence.

Time: 60 minutes. **Max Marks:** 60

Q1: Answer the following Questions: [Marks=30]

i. What is the purpose of virtualization in operating systems?
ii. What are system calls? Give at least two different examples of system call.
iii. What are the advantages and disadvantages of using the microkernel approach of design of operating systems?
iv. What are CPU bound and I/O bound processes?
v. When does a process move from Running to Waiting state and from Running to Ready state?
vi. What operations are performed during context switching of a process?
vii. Differentiate between long term and short term schedulers?
viii. Differentiate between preemptive and non-preemptive scheduling algorithms?
ix. Which CPU scheduling algorithm(s) may cause starvation of processes?
x. Differentiate between Ready queue and Disk queue.

Q2: Given the following piece of code: (6)

```
main(int argc, char ** argv)
{
        int child = fork();
        int c = 5;

        if(child == 0)
        {

                c += 5;
        }
        else
        {
                child = fork();
                c += 10;
                if(child)
                        c += 5;
        }
}
```

How many different copies of the variable c are there? What are their values?

Q3 (a) Given the following processes with their next CPU burst and arrival time. Give Gantt chart using the following scheduling algorithms: (8)

Process	Next CPU burst	Arrival Time
P0	10	0
P1	15	2
P2	5	4
P3	4	6
P4	12	8

i. Shortest-Job-First (Use preemptive scheme).
ii. Round-Robin (Time Quantum = 5msec)

Q3 (b) Calculate the average waiting time and the average turnaround time for each of the scheduling algorithms mentioned in (a) above. (8)

Q3(c) Using preemptive priority-based scheduling, give the Gantt chart and calculate the average waiting time for the following priorities where 1 is the highest priority: (8)

P0 = 5; P1 = 3; P2 = 6; P3 = 4; P4 = 1