No rough sheet given in exam as were not available

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OPERATING SYSTEM (CS-205)

Mid-1, Fall 2016

Date: September 21, 2016 | Marks: 50 | Time: 60 mins

ROLL# L13-5844 SECTION A

Instructions: There is no need for a separate answer sheet. Your answer should be concise enough to take only the space given to you. ***You can ask for a sheet for rough work****, where you can first write the answers, amend it numerous times, but only write on this sheet when you are sure. Cutting on this sheet will reduce your marks.*

Question 1 (5 points): List down the four layers of a computer system.

1. hardware
2. application programs
3. operating system
4. user

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Question 2 (5 points): We know that it is hard to define the boundaries of an Operating System. Still, there are few components of an operating system which are essential to use a computer hardware properly. You are required to list these three components. (Hint: think about the microkernel.)

1. kernel
2. Application interface
3. Memory

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Question 3 (10 points): What happens when a user presses a key on the keyboard? List the steps which take the key code from the hardware (keyboard) and hand it over to the application. Each step you write here, you must mention one component of the Operating System responsible for completing that action.

- passes the key code to keyboard buffer (device)
- move that code from buffer to memory (keyboard buffer)
- generates interrupt (keyboard service routine)
- asks for CPU to serve the routine (interrupt)
- ~~~~ checks interrupt vector table
- picks the address of the keyboard routine from I
- services the routine (CPU)
- passes the keycode to application (from memory)
- returns control to CPU
- goes back to the next instruction to be executed

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Question 4 (5 points): Briefly explain the difference between a program and a process.

Program is passive as it resides in secondary storage and can be accessed even when CPU is rebooted whereas Process is active entity as it resides in primary memory ram and is responsible for giving the process ~~execution~~ [illegible] and does [illegible] the scheduling

Question 5 (5 points): Define "dispatch latency". What is the effect of scheduling algorithm on "dispatch latency"? Can a scheduling algorithm increase or decrease "dispatch latency"?

dispatch latency: it is basically the time to remove one process and load another process. Yeah dispatch latency is affected by scheduling algorithm as multiple processes are being removed and loaded. It decreases dispatch latency

Question 6 (10 points): List the steps involved in switching two processes.

- saves the state of the previous process in PCB.
- loads the ([illegible]) process in PCB
- allocate the resources to a [illegible] process i.e (memory) etc
- brings the process to the main memory (RAM).
- executes the process
- removes the process from memory after execution
- goes to the saved state of previous process
- gives memory to that process
- executes the process
- restores the state.

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Question 7 (5 points): Where does the kernel store the information about a process? List the main elements of that information.

It is process control block (PCB)
Registers
program counter
previous process state
present process state

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Question 8 (5 points): The first table shows the arrival times of processes. The second table shows which process consumed which quantum according to round robin scheduling algorithm. Calculate the average waiting time in this case.

Process Name	Arrival Time	Required Burst Time
P_1	0	30
P_2	20	50
P_3	40	10

Quantum Number (each 10 cycles)	Executing process's name
1	P_1 ✓
2	P_1 ✓
3	P_2
4	P_1 ✓
5	P_2
6	P_3
7	P_2
8	P_2
9	P_2

5/

P_1	P_1	P_2	P_1	P_2	P_3	P_2	P_2	P_2

0, 10, 20, 30, 40, 50, 60, 70, 80, 90

[illegible]

waiting time
P_1 = 10
P_2 = 20
P_3 = 10

(this observed by seeing arrival time and calculation on calculator)

Avg waiting time $= \frac{10+20+10}{3} = 13.33$