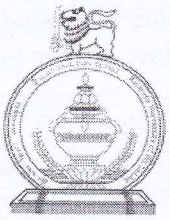

RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
Third Year - Semester II Examination – Oct. /Nov. 2017

COM 3306 – OPERATING SYSTEMS

Time: Three (03) hours

Answer all Questions.

1.

a. Distinguish between application software and system software. (4 marks)
b. Briefly explain the goals of scheduling in a real time operating system. (4 marks)
c. What is the difference between kernel and user mode? Explain how having two distinct modes aid in designing an operating system. (6 marks)
d. Virtual machines have become very popular for a variety of reasons. Nevertheless, they have some downsides. Explain with 2 examples. (6 marks)

(Total: 20 marks)

2.

a. Explain the advantages of implementing threads in user space rather than in kernel space. (5 marks)
b. Briefly explain the use of pop up threads in distributed systems with a suitable example. (4 marks)
c. Does Peterson's solution to the mutual-exclusion problem work when process scheduling is preemptive? What happens when the scheduler is non-preemptive? (6 marks)
d. Explain the use of maintaining process control blocks in the operating system. (5 marks)

(Total: 20 marks)

3.

a. Five batch jobs, A through E, arrive at a computer center at almost the same time. They have estimated running times of 10, 6, 2, 4, and 8 minutes. Their (externally determined) priorities are 3, 5, 2, 1, and 4, respectively, with 5 being the highest

priority. For each of the following scheduling algorithms, determine the mean process turnaround time. Ignore process switching overhead.

i. Round robin.
ii. Priority scheduling.
iii. First-come, first-served (run in order 10, 6, 2, 4, and 8).
iv. Shortest job first.

For (i), assume that the system is multiprogrammed, and that each job gets its fair share of the CPU. For (b) through (d), assume that only one job at a time runs, until it finishes. All jobs are completely CPU bound. (8 marks)

b. What is the difference between a physical address and a virtual address? (3 marks)

c. Explain how Translation Lookaside Buffer helps with the issues of paging system. (5 marks)

d. Do you think that FIFO is an optimal page replacement algorithm? Justify your answer by comparing with other page replacement algorithms. (4 marks)

(Total: 20 marks)

4.

a. A system has four processes and five allocated resources. The current allocation and maximum needs are as follows:

		Allocated	Maximum	Available
Process	A	1 0 2 1 1	1 1 2 1 3	0 0 x 1 1
Process	B	2 0 1 1 0	2 2 2 1 0	
Process	C	1 1 0 1 0	2 1 3 1 0	
Process	D	1 1 1 1 0	1 1 2 2 1	

What is the smallest value of x for which this is a safe allocation? (6 marks)

b. "One way to eliminate circular waiting is to have a rule saying that a process is entitled only to a single resource at any moment." Give an example to show that this restriction is unacceptable in many cases. (4 marks)

c. Distinguish between the sequential file access and random access by specifying where those two methods are applicable. (4 marks)

d. Explain the advantages and disadvantages of contiguous allocation of files in disks over link list allocation. (6 marks)

(Total: 20 marks)

5.

a. In which of the four I/O software layers is each of the following done. (4 marks)

i. Computing the track, sector, and head for a disk read.
ii. Writing commands to the device registers.
iii. Checking to see if the user is permitted to use the device.
iv. Converting binary integers to ASCII for printing.

b. Distinguish between precise and imprecise interrupts. (5 marks)

c. State and briefly explain the challenges of I/O software. (5 marks)

d. Compare RAID level 0 through 5 with respect to read performance; write performance, space overhead, and reliability. (6 marks)

(Total: 20 marks)

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