RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
Third Year - Semester II Examination – February/March 2019

COM 3306 – OPERATING SYSTEMS

Time: Three (03) hours

Instructions to Candidates:

1. This paper contains **FIVE (05)** questions in **THREE (03)** pages.
2. This paper counts for 70% of final evaluation.
3. Answer **ALL** questions.

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1. a. **"Client server model of Operating System (OS) architecture, is cost effective than the layered architecture of OS"**. Do you agree with this statement? Justify your answer.
(05 marks)

b. Distinguish between operating systems in distributed systems and real time OS.
(06 marks)

c. **"Processes in ready state can be swapped out".** Explain the reason for this transition.
(05 marks)

d. Explain the advantages of having user level threads than the kernel level threads.
(04 marks)

(Total 20 marks)

2. a. Distinguish between semaphore and mutex in relation to their uses in Inter Process Communication (IPC).
(04 marks)

b. Explain the use of having semaphores in making blocking system calls.

(05 marks)

c. Explain why having preemptive scheduling is desired in real time systems.

(05 marks)

d. **"Scheduling algorithm of shortest remaining time next is better than shortest job first".** Do you agree with this statement?

(06 marks)

(Total 20 marks)

a. Assume that A, B, C and D are processes and they are holding and waiting for multiple copies of resources printers, scanners, plotters and Tape Drives. The current allocation of the resources is mentioned in table (a) and the resources that are immediately requested by the processes are mentioned in table (b). The existing and available vectors of each resource respectively are denoted by E and A. State all the possible ways of safe allocation of future requests of the processes in order not to have deadlocks.

E= (3,3,4,4)

process	printer	scanner	plotter	Tape Drives
A	2		3	
B		1		2
C	1		1	
D				2

A= (0,2,0,2)

process	printer	scanner	plotter	Tape drives
A		1		2
B	3		2	
C		3		
D	3			

(04 marks)

b. Deadlock prevention can be done by attacking one of the conditions to occur a deadlock. Explain what the conditions for occurring a deadlock are and how the deadlocks can be prevented.

(06 marks)

c. **"Two phase locking can lead to starvation".** Do you agree with this statement? Justify your answer.

(05 marks)

d. **"With DMA controller, system bus can operate in cycle stealing and block mode".** What type of benefits you see in the latter mode?

(05 marks)

(Total 20 marks)

4. a. **One of the goals of Input Output (IO) software is achieving device independency.** Explain how the device independency can be achieved with IO software.

(07 marks)

b. **"Performance of RAID levels depends on the number of updates to be done for the data storage"**. Explain this statement with respect to RAID 4 and 5.

(04 marks)

c. Explain two (02) free disk block administration methods.

(05 marks)

d. Briefly explain two (02) methods of implementing directories.

(04 marks)

(Total 20 marks)

05. a. Explain relocation and protection in multiprogramming.

(04 marks)

b. Compare and contrast free memory management with bitmaps and linked lists.

(04 marks)

c. Distinguish between page frame and page.
Following 2 addresses show the virtual and the physical memory addresses of a particular instruction loaded in to the memory.

Virtual address - 8196
Physical address – 24580

What are the page frame and page number of the instruction in page table? (assume the system is 16 bits)

(06 marks)

d. In a particular program execution, order of page referencing information of 0,1,2,3 pages is as follows. Suppose that it is needed to do a page replacement. Explain which page is going to be removed if the system uses Least Recently Used (LRU) page replacement algorithm.

Pages referenced: 0 1 2 3 2 1 0 3 2 3

(06 marks)

(Total 20 marks)

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