



**RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES**

**B.Sc. (General) Degree in Applied Sciences
Third Year - Semester II Examination – July/August 2020**

COM 3306 – OPERATING SYSTEMS

Time: Three (03) hours

Instructions to Candidates:

1. This paper contains FIVE (05) questions in THREE (03) pages.
 2. Paper counts for 70% of final evaluation.
 3. Answer ALL questions.
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1. a) Briefly explain the two (02) operating modes of a CPU with its functions in two (02) modes. **(06 marks)**
 - b) What is the difference between timesharing and multiprogramming systems? **(04 marks)**
 - c) State four (04) advantages of Layered architecture of Operating systems. **(04 marks)**
 - d) What is a trap instruction? Explain their use in operating systems. **(06 Marks)**
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2. a) What are the disadvantages of implementing threads in user space? **(04 marks)**
 - b) Does Peterson's solution to the mutual-exclusion problem works when process scheduling is preemptive? What happens when it is non preemptive? **(06 marks)**
 - c) Can the priority inversion problem occur with user-level threads? Why or why not? **(06 marks)**

- d) Consider the following solution to the mutual-exclusion problem involving two processes P0 and P1. Assume that the variable turn is initialized to 0. Process P0's code is presented below.

```

/* Other code */
While (turn != 0) { } /* Do nothing and wait. */
Critical Section /* ... */
turn = 0;
/* Other code */

```

For process P1, replace 0 by 1 in above code. Determine if the solution meets all the required conditions for a correct mutual-exclusion solution.

(05 marks)

3. a) Five jobs are waiting to be run. Their expected run times are 9, 6, 3, 5, and X. In what order should they be run to minimize average response time? (Your answer will depend on X.)
(04 marks)
- b) Briefly explain the reasons why achieving Mutual Exclusion is unwise through the mechanism of busy waiting.
(06 marks)
- c) Explain the use of Semaphores with respect to achieving mutual exclusion with blocking system calls.
(05 marks)
- d) "Processes in ready state can be swapped out". Explain the reason for this transition.
(05 marks)
4. a) Compare and contrast memory management with bitmaps and memory management with linked lists.
(06 marks)
- b) Suppose the pages 0,1,2,3 in a page table has been referenced in following manner:
0 1 2 3 2 1 0 3 2 3
If a page fault occurs, state which page is replaced if it uses Least Recently Used page replacement algorithm. Explain your answer.
(05 marks)
- c) Briefly explain the advantages of keeping separate memory for addressing Input/output devices through Memory Mapped input/output.
(05 marks)
- d) Explain how the device independence is achieved through input/output software.
(04 marks)

05. a. What are the conditions to be satisfied in order to occur a deadlock? Explain how global numbering of resources is used in deadlock prevention. **(06 marks)**
- b. State two (02) different file types and compare and contrast between such file types. **(05 marks)**
- c. Explain the use of I-Nodes in file implementation. **(04 marks)**
- d. Mention the common parts of a disk partition. **(05 marks)**

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