RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES
B.Sc. (Information Communication Technology) Degree
Third Year Semester II Examination April/ May 2016

ICT 3213 – ADVANCED OPERATING SYSTEMS

Answer **any four (04)** questions   Time: **2 hours**

01   a.   *"There are four (04) situations when a short-term scheduling decision needs to be made"*. State and explain these four situations.

(05 Marks)

    b.   *"A non-preemptive scheduling decision would not create any race conditions"*. Do you agree with this statement? Explain why or why not.

(05 Marks)

    c.   *"In some situations a real-time operating system may not be schedulable"*. Discuss the requirement for a real-time operating system to be schedulable.

(05 Marks)

    d.   Discuss why busy-waiting techniques of achieving mutual exclusion are not attractive. Use an appropriate example in your discussion.

(10 Marks)

02   a.   *"With paging, a memory reference would (actually) require two memory references"*. Explain why it is and discuss the function of *Translation Lookaside Buffer (TLB)* in improving the performance. Use diagrams if necessary.

(10 Marks)

    b.   *"The optimal page replacement algorithm is impossible to be implemented"*. Discuss why it is impossible to implement optimal page replacement algorithm.

(05 Marks)

    c.   What is a *working set* of pages? How can the working set of a process be computed?

(10 Marks)

03   a.   *"Journaling file systems are more robust in the face of a failure"*. Discuss how this robustness is achieved.

(05 Marks)

b. *"Most UNIX systems have used the concept of a VFS (virtual file system) to try to integrate multiple file systems into an orderly structure"*. Elaborate the concept of virtual file system and its key features.

(05 Marks)

c. What are the main issues related to backing up a file system? How are they overcome?

(10 Marks)

d. *"Block caching reduces disk access"*. Discuss the problems of block caching.

(05 Marks)

04 a. *"In general, (resource) deadlocks involve nonpreemptable resources"*. Do you agree with this statement? Explain why or why not.

(05 Marks)

b. *"Deadlock avoidance is much better than recovery from a deadlock"*. Discuss the key features of deadlock avoidance algorithms.

(10 Marks)

c. *"Preventing deadlocks needs attacking conditions leading to a deadlock"*. What are the conditions that can be attacked? How are they attacked?

(10 Marks)

05 a. *"Type 0 hypervisors can offer virtualization-within-virtualization functionality"*. What is a type 0 hypervisor? How does it provide virtualization-within-virtualization?

(05 Marks)

b. Elaborate the use of *shadow page tables* in memory virtualization. Use diagrams if necessary.

(10 Marks)

c. Discuss the key features of *remote procedure call* technique.

(10 Marks)

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