RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Information and Communication Technology
First Year - Semester II Examination – Oct. /Nov. 2017

ICT 1308 – OPERATING SYSTEMS

Time: Three (03) hours

Answer all Questions.

1.

a. Explain how the Client Server architecture differs from general architecture of operating systems? Highlight the benefit of Client Server architecture. (5 marks)

b. State the purpose of interrupts in a computer system. Distinguish in between a trap and an interrupt. (6 marks)

c. Describe the actions taken by the kernel during context-switching between processes. (4 marks)

d. **"A process can be terminated voluntarily or involuntarily."** Briefly discuss the different situations a process can be terminated giving examples where these terminations take place. State whether each of these terminations are voluntary or involuntary. (5 marks)

(Total: 20 marks)

2.

a. **"In a multi-threaded environment, Protection between threads is impossible and also not necessary".** Do you agree with this statement? Justify your answer with examples. (6 marks)

b. **"Inter process communications leads to race conditions".** Explain what a race condition is and explain an approach of avoiding it. (5 marks)

c. Explain the drawbacks of achieving mutual exclusion with busy waiting with respect to the inter process communication. (4 marks)

d. State the situations the scheduling decision should be made and explain the goals of scheduling in any type of operating system. (5 marks)

(Total: 20 marks)

3.

a. Consider the given matrix of allocation and maximum requirement of a particular resource among 3 processes called A, B and C. After the allocation, 6 copies of the resource are available. Explain a suitable way of safe allocation of the resource among the processes to avoid deadlock. (6 marks)

	HAS	MAX
A	2	8
B	4	14
C	3	11

Free: 6

b. **"There are different strategies to deal with deadlocks."** State these strategies and then explain the ways of preventing deadlocks. (5 marks)

c. Briefly explain the advantages of memory mapped Input Output (I/O) over keeping separate memory for I/O space. (5 marks)

d. Distinguish between the user space I/O software and device independent I/O software. (4 marks)

(Total: 20 marks)

4.

a. **"The security of data can be ensured in RAID level 5 and 6 than in other levels of RAID."** Do you agree? Explain your answer by comparing different RAID levels. (8 marks)

b. Discuss the function of the CPU clocks. (3 marks)

c. Explain the following components with respect to the file system layout.
   i. Super Block
   ii. Free Blocks
   iii. I-nodes
   iv. Root directory (4 marks)

d. Compare and contrast the file implementation strategies of contiguous allocation and linked list allocation. (5 marks)

(Total: 20 marks)

5.

a. **"Managing free memory can be done with bitmaps and linked lists."** Explain which method is more beneficial and why. (6 marks)

b. What do you mean by a page fault? Explain how the Operating System acts when a page fault is occurred. (5 marks)

c. Suppose you have a mapped instruction within virtual address 8196 (16 bit address). According to the page table, it is stored in page number 4. Obtain the physical address of the instruction. The page size is 4KB. Clearly state your approach. (4 marks)

Page No.	Page Frame No.	Present/Absent bit
15	000	0
14	000	0
13	000	0
12	000	0
11	111	1
10	000	0
9	101	1
8	000	0
7	000	0
6	000	0
5	011	1
4	100	1
3	000	1
2	110	1
1	001	1
0	010	1

d. Explain why FIFO page replacement algorithm is not popular and state how you solve the issues with FIFO by using second chance page replacement algorithm. (5 marks)

(Total: 20 marks)

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