



## Vavuniya Campus of the University of Jaffna

First Examination in Information and Communication Technology - 2017

Second Semester - March/April 2019

ICT1233 Operating System

Answer Five Questions Only

Time Allowed: Three hours

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1. (a) Define what is an Operating System. [15%]  
(b) Give any three factors that determine the performance of a computer. [15%]  
(c) Give any four disadvantages of Batch System. [20%]  
(d) State clearly the significance of multiprogramming in an operating system. [20%]  
(e) Give two suitable examples for each of the following type of operating system.  
(i) Mobile (ii) Network/Server (iii) Workstation [15%]  
(f) Give three advantages of Graphical User Interfaces in an Operating System. [15%]
2. (a) State what is meant by a process. [15%]  
(b) Write the components of a thread. [10%]  
(c) Give any two process control "System Call". [10%]  
(d) Briefly describe the five state process model with an aid of a simple diagram. [15%]  
(e) Consider the system that uses Shortest Job First (SJF) scheduling policy under the following process load given in Table 1.

*[To be continued...]*

Table 1: Process Details

$P_i$	0	1	2	3	4
Burst Time( $P_i$ )	75	40	25	30	45
Arrival Time( $P_i$ )	0	10	10	55	95

- i. Calculate the average turnaround time for the processes given above. [15%]
- ii. Calculate the average waiting time for the above processes. [15%]
- (f) Compare and contrast *monolithic kernel* with *micro kernel*. [20%]
3. (a) Explain what is meant by "Critical Section" with regard to resource sharing in interprocess communication. [15%]
- (b) Briefly describe what is meant by "Deadlock". [15%]
- (c) State what you understand by "Starvation" in process management. [10%]
- (d) List the four conditions that must be achieved by a good solution to handle concurrent access of shared resource. [20%]
- (e) Assume that there are five processes (P1, P2, P3, P4 and P5) and four types of resources (R1, R2, R3 and R4). The available resources in R1, R2, R3 and R4 are 8, 5, 9 and 7, respectively. The system state is given at time  $t_0$  in Table 2.

Table 2: The System State

Details	Current Allocation				Maximum Demand			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	2	0	1	1	3	2	1	4
P2	0	1	2	1	0	2	5	2
P3	4	0	0	3	5	1	0	5
P4	0	2	1	0	1	5	3	0
P5	1	0	3	0	3	0	3	3

[To be continued...]

- i. Create the need-matrix. [20%]
  - ii. Using Dijkstra's Bankers's algorithm, find whether the system is in a safe state. Justify your answer by showing the work in detail. [20%]
4. (a) Briefly describe how Base register and Limit register are used to handle the protection and relocation problem in memory management. [20%]
- (b) Explain the use of Virtual Addressing in memory management. [20%]
- (c) State what you understand by "Compaction" in memory management. [10%]
- (d) Consider a system that has 1024 pages for a process  $P_0$  and each page sizes 64 Bytes and the size of the physical memory is 2MB. Find the number of bits for virtual address and the number of bits for physical address. [20%]
- (e) Suppose the details of the Page Table is given in Table 3:

Table 3: Page\_No and Page\_Frame\_No

Page_No	0	1	2	3	4
Page_Frame_No	10	7	6	9	2

Find the physical address of each of the virtual addresses of the following using

Table 3: (i) 145 (ii) 125 [30%]

5. (a) Briefly describe about "Demand Paging" method of virtual memory management. [15%]
- (b) Compare and contrast "Swap-IN" and "Swap-Out" using a diagram. [15%]
- (c) Give any two advantages of Demand Paging. [20%]
- (d) Explain the need of Page Replacement techniques in memory management. [20%]
- (e) Consider the following page reference string and compute the hit ratio using Reference String : 0,2,1,6,4,0,1,0,3,1,2,1.
- i. Least Recently Used (LRU) page replacement algorithm.
  - ii. Optimal Page (OPT) page replacement algorithm. [30%]

6. (a) State what you mean by Unauthorized access to data. [20%]  
(b) List any four characteristics of a good password with the aid of suitable examples. [20%]  
(c) List the Operating System facilities to secure the resources of a computer. [20%]  
(d) State any five attributes of a file. [10%]  
(e) Give the significant difference between "Absolute Path" and "Relative Path". [15%]  
(f) Briefly describe about "Disk Caching" in file management. [15%]