

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. code : 1A-16-1

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FIRST SEMESTER M.TECH DEGREE EXAMINATION DEC 2016

Computer Science and Engineering

08CS 6011 OPERATING SYSTEM DESIGN

Time: 3 hours

Max. Marks: 60

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1.a	Describe the events happening when an interrupt and rti occurs.	3
Answer b or c		
b	With a neat sketch explain the architecture of an operating system and process states.	6
c	Discuss the file system calls. Write a program that determines the length of a file without using a loop in the code.	6
Q.no	Module 2	Marks
2.a	Relate the terms race condition, atomic action, critical section and mutual exclusion.	3
Answer b or c		
b	Write the solution for the IPC pattern of mutual exclusion, signaling and rendezvous. Illustrate with an example.	6
c	With a real time scenario explain a deadlock situation. Explain how to deal with a deadlock.	6
Q.no.	Module 3	Marks
3.a	Explain virtual memory with segmentation.	3
Answer b or c		
b	Using page reference strings 1,2,3,2,4,2,5,2,3,4 compare the page replacement algorithms FCFS, Optimal, LRU and Clock. Consider the number of frames as 3. Why is LRU a good page replacement algorithm?	6
c	With suitable example explain the List and Bitmap methods of keeping track of blocks. List the advantages of each method.	6

Q.no.	Module 4	Marks
4.a	Compare a serial port controller with SCSI controller. What are the similarities and differences between them?	3

Answer b or c

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| b | Suppose we have a disk with 200 tracks. The disk head starts at track 100 and, for the elevator algorithm, the disk head is moving up (to larger track numbers). Suppose the disk request queue contains the following request in order at time 0: 55, 58, 39, 18, 90, 160, 150, 38, 184. Compute the average time to service a request for the disk head scheduling algorithms FCFS, SSTF, Elevator. | 6 |
| c | Why is it useful to put I/O devices and I/O controllers in different hardware units? What is the main function of device controllers? | 6 |

Q.no.	Module 5	Marks
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| 5.a | Suppose that the block size in a file system is 1 Kbyte, the average file is 512 bytes long, a file descriptor is 64 bytes long, and we allocate file descriptors in a special area of the file system. When we create the file system, we have to decide how much of the file system space to allocate for file descriptors. If we have a file system of 10000 blocks, what percentage of it should be allocated to file descriptors? Make some assumption about the distribution of file size and state our assumption in your answer. | 4 |
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Answer b or c

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| b | Which are the main file system data structures and how are they connected to each other? Show the control flow for open and read system call. | 8 |
| c | Compare the different methods to keep the disk block pointers. | 8 |

Q.no.	Module 6	Marks
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| 6.a | Illustrate how process scheduling can be done in real time operating system. Suppose you have a real-time system where process A needs 20ms of processor time every 100 ms, B needs 20ms of processor time every 100 ms, C needs 10 ms of processor time every 50 ms, D needs 40ms of processor time every 200 ms, E needs 10ms of processor time every 100 ms. Figure out a fixed schedule for these process that will meet all their needs. | 4 |
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Answer b or c

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|----------|---|----------|
| b | Discuss the mechanisms for hardware and software protection of resources in a system. Why are capability lists not widely used? How are protection domains helpful? | 8 |
| c | Discuss the naming of objects. Write an algorithm for creating unique names without race condition. | 8 |