APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : 1A171 **(Pages: 4)** **Name** .....

Reg. No: .....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION December 2017

Branch: Computer Science **Specialization: Computer Science and Engineering**

08 CS 6011 OPERATING SYSTEM DESIGN

Time:3 hours **Max.marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	What is a shell? Name any one shell which is available in Linux. What happens when a command is executed in a shell?	3
	Answer b or c	
b	Discuss the following design technique with suitable examples: (i) Two level implementation (ii) Decomposition patterns	6
c	Write a program using the Unix process management system calls (*fork, execv* and *wait*) to create a child process. The child process should run '*whoami*' command and the parent process must hold its execution until the child process terminates.	6

Q.no.	Module 2	Marks
2.a	Two-phase locking can lead to starvation. Explain how this can happen? Explain why deadlock is not possible?	3
	Answer b or c	
b	For each of the following situations, decide which of the IPC patterns models the situation most closely. i) Processes in a Unix pipeline ii) Updating and accessing (at logon) the password file iii) Two or more users playing games over local area network iv) Printing documents v) Name servers that translate names into network addresses vi) An airline reservation system where there are many travel agents trying to book flights	6

c Consider a system with 3 processes P_1, P_2, P_3 and 3 resource types R_1, R_2, R_3. Suppose at time t_0 following snapshot of the system has been taken: 6

Process	Claim Matrix			Allocation Matrix			Available		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
P_1	2	1	2	1	0	1	2	1	2
P_2	3	2	4	0	0	1			
P_3	4	2	1	1	1	1			

i) How many resources of type R_1, R_2, R_3 are there?

ii) Is the system safe? If yes, what is the safe sequence?

iii) Consider each of the following request and say if they can be granted?

(1) P_3 request (1,0,0) (2) P_1 request (0,1,0) (3) P_2 request (2,0,0) (4) P_2 request (1,0,1)

Q.no.	Module 3	Marks
3.a	Many modern operating systems will dynamically load parts of the operating system. Give one example of a part of the operating system that would be a very good candidate for dynamic linking, and give one example of a part of the operating system that you would not want to dynamically load.	3

Answer b or c

b Explain second chance page replacement algorithm. A computer has four page frames. The time of loading, time of last access, and the R & M bits for each page are as shown below (the times are in clock ticks): 6

Page	Loaded	Last Reference	Reference Bit (R)	Modified Bit (M)
0	126	280	1	0
1	230	265	0	1
2	140	270	0	0
3	110	285	1	1

i) Which page will FIFO replace?

ii) Which page will LRU replace?

iii) Which page will FINUFO replace?

iv) Which page will second chance algorithm replace?

c Many windows managers implement virtual desktops that are larger than the physical screen. They also implement multiple desktops that you can switch between. Describe these features in terms of multiplexing. 6

Q.no.	Module 4	Marks
4.a	Explain briefly about Universal Flash Storage. What are the new features available in UFS 2.1?	3

Answer b or c

b Device drivers are usually structured in two levels. 6

i) Explain exactly what is meant by a "two-level device driver".

ii) What are the advantages of structuring a device driver in two levels?

iii) What are the disadvantages?

c On a disk with 1000 cylinders, numbers 0 to 999, compute the average seek length for the following scheduling algorithms. Assume the last request received was at track 345 and the head is moving towards track 0. The queue in FIFO order contains requests for the following tracks 123, 874, 692, 475, 105 and 376. Also compute the average seek length for the following scheduling algorithms: 6

i) FIFO

ii) SSTF

iii) SCAN

iv) LOOK

v) C-SCAN

vi) C-LOOK

Q.no.	Module 5	Marks
5.a	What do you mean by a journaling file system? Give an example for a journaling file system.	4

Answer b or c

b Explain in detail about Android File System architecture. Which file system is used for */system* and */sdcard* partition in Android? 8

c What is a superblock, inode, dentry and a file? Write down the Linux command for the following: 8

i) To view superblock information of *ext4* file system in the */dev/sda1* partition

ii) To check the *ext4* file system in the */dev/sda1* partition for any errors

Q.no.	Module 6	Marks
6.a	What do you mean by adjoined name space? In the context of adjoined directories, what does shadowing mean? Give an example of shadowing.	4

Answer b or c

b Consider a library as a resource manager for books. Explain how it does each of the tasks of a resource manager and how it strives towards the goals of a resource manager. 8

c What is Mandatory Access Control? Discuss SELinux implementation of MAC for Linux. Write down the commands for the following: 8

i) To display the current SELinux mode

ii) To put SELinux into permissive mode