



**KONERU LAKSHMAIAH
EDUCATION FOUNDATION**
(Deemed to be University, Estd. u/s. 3 of UGC Act 1956)

**B.Tech - Odd Sem : Semester in Exam-I
Academic Year:2020-2021**

19CS2106S - OPERATING SYSTEMS DESIGN - S

Set No: 1

Time:		Max.Marks: 50					
S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	Disk blocks allocated to a file are added to the free list when the file is deleted. Write an algorithm to perform this operation in Unix.	choice Q-2		4.5Marks	CO1	3	2
2.	xv6's mkfs program generate layout for an empty file system. Illustrate xv6 on-disk layout where Block 0, 1, 2 are fixed. Explain the purpose and goal of Logging (Transactions).			4.5Marks	CO1	3	2
3.	(i). What is the buffer header and during system initialization why kernel allocates space for a number of buffers. Suppose the kernel does a delayed write of a block. What happens when another process takes that block from its hash queue? From the free list? (ii). Write a system program that list files names and inode numbers in a given directory, like when you execute the following command: \$ ls - la	choice Q-4		8Marks	CO1	3	3
4.	(i). When can a file be deleted from disk? how does xv6 delete a file? List xv6 kernel code functions/algorithms and files directly or indirectly used for command \$ rm a (ii). How read system calls work. Explain algorithm. What are its input parameters and returns information. Describe xv6 functions: filealloc, filedup, and fileclose.			8Marks	CO1	3	3
5.	Answer all the questions	choice Q-6		12.5Marks	CO1	3	3
5.A.	In xv6, Explain the working of open("a/b/c", O_RDWR). List xv6 kernel code functions/algorithms used			6Marks	CO1	3	3
5.B.	Explain about structure of a regular file and bmap algorithm in detail. Given a disk-block size of 1 KB and block-pointer address value of 8 bytes, what is the largest file size (in bytes) that can be accessed using 10 direct addresses and one indirect block?			6.5Marks	CO1	3	3
6.	Answer all the questions			12.5Marks	CO1	3	3
6.A.	Suppose a process wants to write a few bytes. Let's assume we want to write 100 bytes, starting with byte 2000 in the file. This will be expressed by the pair of system calls: seek(fd,2000); write(fd,buf,100); Let's also assume that each disk block is 1024 bytes. Illustrate how Writing may require new blocks to be allocated according to its internal structure, algorithms, and data structures.			6.5Marks	CO1	3	3

6.B.	Explain Inode Life Cycle with ialloc(), iput() algorithms. Typical accessing inode example in Xv6 source code. ip = iget(dev, inum); ilock(ip); /* ... examine and modify ip->xxx ... */ iunlock(ip); iput(ip);			6Marks	CO1	3	3
7.	An OS supports a system call sleep, which puts the program making the call to sleep for the number of seconds indicated in the argument of the sleep call. Explain how this system call is implemented.	choice Q-8		4.5Marks	CO2	3	2
8.	Explain the xv6 code for mycpu and myproc.			4.5Marks	CO2	3	2
9.	(i). How many levels does the UNIX scheduling algorithm include? What are they? In its low-level algorithm, how is the priority value for every process computed? What does each of the three components in the priority formula mean, respectively? How does the priority formula indicate that UNIX gives higher priority to processes that have used less CPU time in the recent past? Explain the reason by describing the computation process of the priority formula. (ii). Write a system program to execute a command and redirect the output to a file : \$ wc sample.txt > newfile.	choice Q-10		8Marks	CO2	3	3
10.	(i). In xv6, explain the purpose of init.c. How shell works give an algorithm? (ii). Explain algorithms for stime, time, times, and clock.			8Marks	CO2	3	3
11.	Answer all the questions	choice Q-12		12.5Marks	CO2	3	3
11.A.	List the various sections of the disk image of an executable file in UNIX. In xv6, explain the algorithm for a system call that makes a process to overwrite itself with another executable image.			6Marks	CO2	3	3
11.B.	The traditional UNIX scheduler is a priority-based round robin scheduler (also called a multi-level round robin scheduler). How does the scheduler go about favoring I/O bound jobs over long-running CPU-bound jobs? For the given list of processes and service time: P1 120, P2 60, P3 180, p4 50, P5 300 Answer the following: (i). Draw a Gantt chart that shows the completion times for each process using first-come, first served CPU scheduling. (ii). Draw a Gantt chart that shows the completion times for each process using shortest-job-next CPU scheduling.(iii). Draw a Gantt chart that shows the completion times for each process using round-robin CPU scheduling with a time slice of 60.			6.5Marks	CO2	3	3
12.	Answer all the questions			12.5Marks	CO2	3	3
12.A.	Show a pictorial arrangement - Sharing of kernel data structures and open files between parent and child after fork. What elements of the process context must the kernel explicitly save when handling (i).context switch, (ii) an interrupt, or (iii) a system call? What are the similarities and differences?			6.5Marks	CO2	3	2
12.B.	What do we mean by race condition in the context of multiple processes? Explain race for locked Buffer and			6Marks	CO2	3	3

	free Buffer with a diagram. Give solution using locks. Illustrate xv6 spinlocks.						
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