Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - ARREAR EXAMINATIONS, APR/MAY 2024

INFORMATION TECHNOLOGY
Semester V
IT5002 & Unix Internals
(Regulation 2019)

Time: 3hrs Max.Marks: 100

CO 1	Understand UNIX architecture and describe the component of operating system.
CO 2	Explain how they interact with computer hardware.
CO 3	Gain a deeper understanding of system calls in Unix operating system.
CO 4	Apply the concepts of operating systems design to practical problems.
CO 5	Design and implement the subsystems of an operating system.
CO 6	Critically analyze different data structures and algorithms used in the building of a kernel.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Differentiate between user mode and kernel mode.	2	CO1	L2
2	What are user and kernel stack frames?	2	CO1	L2
3	Compare inode and in-core inode. List the fields in both of them.	2	CO6	L2
4	What is a super block? What are the fields in a super block?	2	CO6	L2
5	What are the differences between the creat() system call and mknod() system call?	2	CO3	L3
6	What is mounting and unmounting?	2	CO3	L1
7	What are the various process states?	2	CO5	L1
8	Differentiate between daemon process, kernel process and user process.	2	CO5	L3
9	What is demand paging policy? What is the advantage of it?	2	CO2	L2
10	What is a disk driver?	2	CO2	L1

PART- B (5 x 13 = 65 Marks)

(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	Explain the architecture of Unix Operating system with neat sketch of the system kernel.	9	CO1	L1
(ii)	Write the Unix command in both symbolic mode and octal mode to set permission where the owner can write, read and execute a file, group and other can only read and execute a file.	4	CO2	L2
	(OR)			
11 (b) (i)	Write the getblk algorithm and explain the following buffer retrieval scenarios with proper diagrams.	9	CO1	L1
(ii)	What are the advantages and disadvantages fo buffer cache?	4	CO2	L2
12 (a) (i)	Write the algorithm to conversion of a path name to an inode.	9	CO5	L2
(ii)	How does the kernel computes the logical disk block and the byte offset of the inode no 12 within the block, assuming block 3 is the beginning of the inode list and there are 6 inodes per block and each disk inode occupies 64 bytes.	4	CO4	L3
	(OR)			
12 (b) (i)	Write the algorithm for allocation of in-core inodes.	9	CO5	L2
(ii)	Illustrate with figures to explain how allocation and freeing of disk blocks happens.	4	CO4	L3
13 (a) (i)	Explain the pipe system call with its syntax and the four cases of reading and writing to a pipe.	9	CO3	L2

(ii)	Consider the following sample program and illustrate the use of pipes.
	`char string[] - "hello";`
	`main()`
	`{`
	`char but1[I024];`
	`char *cp1, *cp2;`
	`int fds[2];`
	`cp1 = string;`
	`cp2 = buf;`
	`while (*cp1)`
	`*cp2++ = *cp1++;`
	`pipe(fds);`
	`for (;;)`
	`{`
	`write(fds[1], buf, 6);`
	`read(fds[0], buf, 6);`
	`}`
	`}`
		4	CO6	L4

	(OR)			
13 (b)(i)	Explain the algorithm for reading a file.	9	CO3	L2
(ii)	Consider the following sample program and show the updates of the I/O parameters in the uarea and update of offset in the file table.	4	CO6	L4

	#include < fcntl.h >
	main()
	{
	int fd;
	char lilbuf[20], bigbuf[1024];
	fd = open ("/etc/passwd", O_RDONLY) ;
	read(fd, lilbuf, 20) ;
	read(fd, bigbuf, 1024) ;
	read(fd, lilbuf, 20) ;
	}			

14 (a) (i)	Explain the algorithm to create a new process and the sequence of operations done during the system call.	**9**	CO3	L3
(ii)	Mention the components that form the context of a process. When does the kernel saves the context of a process?	**4**	CO6	L3
	(OR)			
14 (b) (i)	How does the Kernel load a portion of a file into a region? Explain the algorithms that the Kernel follows while loading a region.	**9**	CO3	L3
(ii)	How signals are sent among processes or kill() system call works?	**4**	CO6	L3
15 (a) (i)	Explain about swapping memory management policy with the required algorithms for the below context. i. Managing space on the swap device ii. Swapping processes out of main memory iii. Swapping processes into main memory	**13**	CO2	L2
	(OR)			
15 (b) (i)	Write the algorithm for handling validity fault.	**9**	CO2	L2
(ii)	Brief about the Page-Stealer process while it decides to swap out a page.	**4**	CO2	L2

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.(i)	Write the code to illustrate the main loop of the shell and demonstrate asynchronous execution, redirection of output, redirection of input and pipes.	**15**	CO4	L5