

GUJARAT TECHNOLOGICAL UNIVERSITY

SUBJECT NAME: OS Programming (Core II)

SUBJECT CODE: 3715302

Semester I

Type of course:

Prerequisite:

1. Fundamental concepts of procedure oriented programming
2. Linux Commands

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	PA (V) ESE	PA (I)	
3	2	0	4	70	30	30	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment;

Content:

Sr. No.	Content	Total Hrs	% Weightage
		6	10
1	Introduction to OS & Overview of architecture		
		6	10
2	Processes Management, CPU Scheduling		
		6	10
3	POSIX Threads, Inter Process Communication - Data Exchange and Synchronization with shared memory		
		7	20
4	message queues, semaphores, Memory management, Virtual Memory and Paging, Virtual File System		
		7	20
5	Pipes & FIFOs, system programming in linux , Linux Architecture, Programming in Linux Shell Programming		

Text Books:

1. Operating Systems: A Design-Oriented Approach by Charles Crowley
2. Beginning Linux Programming by Richard Stone/Wrox

Reference Books:

1. Milankovic M., "Operating System: Concept & Design", McGraw Hill
2. Silberschatz A. and Galvin: "Operating System Concepts", Wiley.
3. Tanenbaum A.S., "Operating System Design & Implementation"/Practice Hall
4. Dhamdhere: Operating System TMH
5. Linux Device Drivers by Corbet and Rubini/ O'Reilly
6. Understanding the Linux Kernel by Bovet and Cesati /O'Reilly
7. Linux Kernel Development by Robert Love/Que
8. Building Embedded Linux Systems by Karim Yaghmour /O'Reilly
9. Optimizing Linux Performance by Phillip G. Ezolt /Prentice Hall
10. Distributed Operating Systems concepts and design - P.K.Sinha(PHI).
11. Advanced Operating System – Singhal
12. Distributed Systems concepts and design-G.Coulouris,J.Dollimore & T.Kindberg

Course Outcome:

1. Student get Idea Exactly Hoe the OS Structure
2. Kernel Compiling.
3. OS Design Architecture

List of Experiments: (with Open Ended Problems)

1. Create maximum no. of processes from common parent and print maximum value when fork fails. Control max no. of processes using ulimit command.
2. Create n processes, where each child process going to create another in sequence and take care of cleaning up them using waitpid.
3. Read any command name as a string and execute in child process using any of execl family of functions. Parent must wait for completion of child and do suitable error handling using waitpid.
4. Write a program to find sum of array elements parallely using multiple threads.
5. Write a program to demonstrate thread cancellation
6. Write a program to print current time in HH:MM:SS format.

```
time_t t1=time(NULL);//time(&t1);

//no.of secs from UTC:1970-1-1 0:0:0

struct tm* pt=localtime(&t1);

//refer man page of localtime to get

hh,mm,ss from pt

//print pt->tm_hour,pt->tm_min,pt->tm_sec

//print ctime(&t1)
```

7. Write a program to write a structure into shared memory by parent process and read the same structure by child process.Parent must destroy shared memory at end.

8. Write a program to store a string by one process into message queue and retrieve the same by another process.

9. Do concurrent increment,decrement operations on a shared variable by two child processes of same parent, and prevent the race conditions using semaphores.

10. Do concurrent increment,decrement operations on a common variable by multiple threads,and observe the race conditions.Prevent the race conditions using mutex.