GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Operating Systems
(Code: 3330701)

Diploma Programme in which this course is offered	Semester in which offered
Information Technology and Computer Engineering	Third

1. RATIONALE

An operating system is the core part of any computer system. The objective of operating system course is making student understand basic structure of an operating system. After learning this subject student will be able to discriminate between various types, process, memory and file management of the operating system. The subject also emphasis on linux utilities and scripting**.**

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **To install & configure various Operating System.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

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

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Operating System Concepts	1a. Learn different operating system	1.1 Need of operating system 1.2 Evolution of operating system
	1b. Explain types of operating system	1.3 Operating systems i. Batch ii. Multi programming iii. Time Sharing iv. Real Time 1.4 Operating System Services 1.5 Case study i. Linux ii. Windows XP
Unit – II Processor & Process Management	2a. Describe process model 2b. Describe process state	2.1 Process and Process management i. Process model overview ii. Programmers view of process iii. Process states
	2c. Compare processor scheduling algorithm.	2.2 Process and Processor Scheduling i Scheduling Criteria ii FCFS iii RR iv SJF v SRTN
	2d. Compare different scheduler 2e. Describe race condition & mutual exclusion	2.3 Schedulers i Inter Process communication & a. synchronization ii Race condition iii Mutual Exclusion iv Monitors
	2f. Identify Deadlocks 2g. Apply Deadlock recovery procedure	2.4 Dead lock i Prevention ii Avoidance iii Detection and recovery
Unit – III Memory Management	3a. Describe memory management	3.1 Memory management
	3b. Differentiate Contiguous and Non-contiguous memory 3c. Differentiate physical and virtual primary memory	3.2 Contiguous allocation i Partitioned memory allocation ii Fixed & variable partitioning iii Swapping iv Relocation v Protection and Sharing 3.3 Non contiguous allocation i Page allocation ii Segmentation iii Virtual Memory
Unit – IV File Management	4a. Apply file management concepts in Operating System	4.1 File management i. User view of file system ii. Attributes and operations iii. File system design iv. Disk space

Unit	Major Learning Outcomes	Topics and Sub-topics
	4b. Explain Directory structure of Operating System	4.2 Directory structure
	4c. Describe Disk organization	4.3 Disk Organization i. Physical structure ii. Logical structure iii. Addressing
	4d. Implement file system security.	4.4 Security and Protection mechanism
Unit – V Linux Basics	5a. Install Free & Open Source Software / Open source Operating System	5.1 Overview of Linux 5.2 Installation and upgrade
	5b. Test and Execute basic Linux commands	5.3 Introduction to shell and commands i. Commands: pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, wc, split, cmp, comm.., diff, head, tail, grep, sort, apt-get install, apt-get remove
	5c. Test and Execute shell commands in a script	5.4 Editing files with "vi", "vim", "gedit", "gcc" 5.5 Linux Shell i. Basic shell scripts

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Operating System Concepts	06	04	06	0	10
II	Processor & Process Management	12	06	10	04	20
III	Memory Management	10	06	08	02	16
IV	File Management	06	04	06	0	10
V	Linux Basics	08	02	04	08	14
Total		**42**	**22**	**34**	**14**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency.
Following is the list of experiments for guidance.

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
1	**I**	Install & test different types of Operating System & compare its features.	2
2	**II**	Compare various process scheduling algorithm	2
3	**V**	Test and run basic unix commands.	2
4		Test and run Advanced unix commands.	2
5		Test commands related with File editing with Vi, Vim, gedit, gcc.	2
6		Create a shell script to print "Hello".	2
7		Create a Shell script to read and display content of a file.	2
8		Create a Shell script to read from command line.	2
9		Create a Shell script to append content of one file to another	2
10		Create a Shell script to accept a string in lower case letters from a user, & convert to upper case letters.	2
11		Create a Shell script to find numbers of characters, words & lines of a given input file.	2
12		Create a Script to reverse a string and display it.	2
13		Create a Script to check a string is palindrome.	2
14		Create a Shell script to add two numbers.	2
15		Create a shell script to reverse the digits of a given 5-digit number. (for eg. , if the no. is 57429 then answer is 92475).	2
		Total	**30**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- PowerPoint Presentation
- Seminar based Presentation

8. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Modern Operating System 3rd Edition, 2008	Andrew Tanenbaum	PHI
2	Operating System Concepts, 3rd Edition	James Peterson Wesley Abraham Silberschatz	JOHN WILEY & SONS. INC
3	Operating Systems, 2010 Edition	Sibsankar Haldar	Pearson Education
4	Operating System, 2005 Edition	Milan Milenkovic	MGH
5	Operating Systems concept based approach (3rd Edition)	Dhananjay M.	MGH
6	Unix Concepts And Application	Sumitabha Das	MGH
7	Linux –Application and administration, 2009 Edition	Ashok Kumar Harnal	TMH

B. List of Major Equipment/Materials

i Linux based Host machines (Free & Open Source Software or Open source)

ii Computers with latest hardware configuration

C List of Software/Learning Websites

i Operating System concepts: http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-ANG/Operating%20Systems/New_index1.html

ii Linux basics: www.freeos.com/guides/lsst

iii Linux basics: www.linuxcommand.org/writing_asell_scripts.php

iv Linux basics: www.distro.ibiblio.org/damnsmall/current/dsl-4.4.10-embedded.zip

9. INSTRUCTIONAL STRATEGY

Concepts will be introduced in lectures and problem solving will be done through practices and assignments. Practical work will be through laboratory sessions.

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. MR. MANOJ P. PARMAR, Incharge Head of Department, Information Technology, Government Polytechnic, Ahmedabad.
2. MR. PARVEZ K. FARUKI, Lecturer, Information Technology, Government Polytechnic, Ahmedabad.
3. MRS. HARSHA P. CHAUHAN, Incharge Head of Department, Information Technology, Government Polytechnic for Girls, Ahmedabad.
4. MR.DARSHAN M. TANK, Incharge Head of Department, Information Technology, Lukhdhirji Engineering College (Diploma), Morbi

Coordinator and Faculty Members from NITTTR Bhopal

1. **Dr. Shailendra Singh**, Professor & Head Dept. of Computer Engineering and Applications, NITTTR, Bhopal.
2. **Dr. K. J. Mathai**, Associate Professor Dept. of Computer Engineering and Applications, NITTTR, Bhopal.
3. **Dr. M. A. Rizvi**, Associate Professor Dept. of Computer Engineering and Applications, NITTTR, Bhopal.