GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

OPERATING SYSTEMS
(Code: 3330701)

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering, Information Technology	3rd Semester

1. RATIONALE

An operating system is the core software of any computer system. This is the basic software or platform on which other software work. Every student of computer science and IT must therefore understand basic structure of an operating system. After learning this subject student will be able to discriminate between various types of operating systems, its processor, processes, and memory and file management. The subject also emphasis on Linux utilities and scripting**.**

2. COMPETENCY (Programme Outcome (PO) according to NBA Terminology):

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 Systems.**

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

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – I Operating System Concepts	1a. Explain 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 v. Multitasking vi. Multithreading 1.4 Operating System Services 1.5 Case study i. Linux ii. Windows 7
Unit – II Processor & Process Management	2a. Describe process model 2b. Describe process state	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 First Come First Serve iii Round Robin 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	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
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
	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 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 a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly 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 practical skills **(Course Outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	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
- Case study

8. SPECIAL INSTRUCTIONAL STRATEGY (If Any)

Concepts should be explained thoroughly in theory sessions and should be implemented in laboratory appropriately along with the problem solving. Concept should be developed by giving problems to students as assignments and in tutorials.

9. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Operating systems	Dhamdhere	MGH
2	Unix Concepts And Application	Sumitabha Das	MGH
3	Modern Operating System 3rd Edition, 2008	Andrew Tanenbaum	PHI
4	Operating System Concepts, 3rd Edition	James Peterson Wesley Abraham Silberschatz	JOHN WILEY & SONS. INC
5	Operating Systems, 2010 Edition	Sibsankar Haldar	Pearson Education
6	Operating System, 2005 Edition	Milan Milenkovic	MGH
7	Operating Systems concept based approach (3rd Edition)	Dhananjay M.	MGH
8			
9	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

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. Manoj P. Parmar**, In-charge Head of Department, Information Technology, Government Polytechnic, Ahmedabad.
- **Prof. Parvez K. Faruki**, Lecturer, Information Technology, Government Polytechnic, Ahmedabad.
- **Prof. (Mrs.) Harsha P. Chauhan**, In-charge Head of Department, Information Technology, Government Polytechnic for Girls, Ahmedabad.
- **Prof. Darshan M. Tank**, In-charge Head of Department, Information Technology, Lukhdhirji Engineering College (Diploma), Morbi

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Shailendra Singh**, Professor & Head Dept. of Computer Engineering and Applications,
- **Dr. K. J. Mathai**, Associate Professor Dept. of Computer Engineering and Applications,