GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME : DIPLOMA IN COMPUTER ENGINEERING

LEVEL NAME : PROFESSIONAL COURSES

COURSE CODE : CM409E$

COURSE TITLE : LINUX Administration

PREREQUISITE : CM404E

TEACHING SCHEME : TH: 03; TU: 00; PR: 04 (1 CREDIT = 1 CLOCK HR.)

TOTAL CREDITS : 05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)

TH. TEE : 03 HRs

PR. TEE : 02 HRs (External)

PT. : 01 HR

❖ RATIONALE:

Operating Systems are most essential components of Computer System. Linux refers to any Unix-like computer operating system which uses the Linux kernel. It is one of the most prominent examples of open source development and free software as well as user generated software; its underlying source code is available for anyone to use, modify, and redistribute freely.

Linux is a portable operating system and students can work on different types of hardware which supports on any kind of hardware platform. Also Linux source code is freely available and is open source and it is community based development project.

This course describes the knowledge of how to work with the LINUX operating systems and is a very useful course for understanding the higher level knowledge in the field of Information Technology / Computer Engineering.

❖ COURSE OUTCOMES :

After completing this course students will be able to –

1. Implement various commands of LINUX Operating System
2. Characterize the Linux security system
3. Develop programs using shell programming
4. Install LINUX operating systems
5. Execute various LINUX commands
6. Operate LINUX Operating System efficiently.

❖ **COURSE DETAILS :**

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Introduction	1. Define various terms related to Linux 2. Describe history of Linux 3. Describe Installation procedure of Ubuntu and Fedora and Mint OS 4. Appreciate Linux kernel data representation	1.1 Introduction to LINUX OS 1.2 Understanding and installation of Ubuntu, Fedora and Mint OS 1.3 The tools & Application. GNU/GPL license 1.4 About Linux – History & who started Linux 1.5 Advantages of using Linux, About Linux distribution 1.6 Linux kernel. Data representation	**04**
2. Vi Editor	1. Define and Describe the commands for appending files into current file and changing text 2. Describe the cursor positioning commands 3. Distinguish the vi screen commands 4. Classify various text related commands 5. Construct Vi editor screen for the given application	2.1 Appending files into current file, Changing Text 2.2 Complete Documentation, Cursor Positioning Commands 2.3 Cutting and Pasting Text, Exiting from vi, Screen commands 2.4 Starting an editing Session, Text Deletion Commands 2.5 Text Insertion Commands, Undo Commands 2.6 vi editor & it's working	**08**
3. Linux Commands	1. Define and Explain features of Linux commands 2. List and describe the Linux commands. 3. Describe the Boot-process 4. Describe the SYSV init process 5. Classify Linux file system 6. Describe the virtual file system in Linux	3.1 Linux Commands touch, tail, whereis, rpm, df, mount, fdisk, uname, shutdown, whoami, netconfig, chkconfig,ping 3.2 Linux Boot Process, feature & GRUB & LILO 3.3 SYSV init process, Init Run Levels 3.4 Linux file system structure- ext 2, ext 3 file system 3.5 Other file system – ufs, reiserfs, IBM, JFS file system 3.6 Virtual file system under Linux	**10**
4. Linux Operating System	1. Define various Linux OS related terms 2. Describe the X Windows System 3. State the terms related with Windows Manager and the shadow password 4. Describe Job Scheduling system 5. Develop Job Scheduling algorithm considering suitable application	4.1 Meta devices, Logical volume manager, RAID technology supported under Linux 4.2 X server & clients- The X Window System 4.3 Window Manager, Run levels, RPM, Daemon, Mount 4.4 Root Account, Feature of Sudo, User Private Group (UPG) 4.5 The shadow password, File system quota 4.6 Job scheduling system	**08**

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
5. Linux System Security	1. Characterize the Linux security system 2. List and elaborate the Hardware and Software used for the security of OS 3. Describe the certifications essential for the security of Linux system 4. Troubleshoot Firewall for network security	5.1 Types of Permissions, Security Principles- host based security & Network based security 5.2 Boot security, Firewall concept, Pluggable Authentication Modules (PAM) 5.3 Advantages of PAM, Symmetric & certificate in an Secure Socket Layer (SSL) transaction	**08**
6. Server and Services	1. List and elaborate the various network and mail servers used in the Linux 2. Describe the working and advantages & dis-advantages of these servers 3. Describe the method of configuring the servers (Apache, Samba, NIS) for working in the Linux environment 4. Describe the procedure of Configuration DHCP and NIS Server 5. Construct APACHE server for configuring web services	6.1 DNS (Domain Name System 6.2 Mail Transfer Agent & Local Directory Agent, pop3 & SMTP (Simple Mail Transfer Protocol) 6.3 Apache server (HTTP), feature of Apache, Working of web server 6.4 Samba server, Advantage of Samba server, NFS (Network File System) server & its usage 6.5 NIS (Network Information Service) server , working of Dynamic Host Configuration Protocol (DHCP) & benefits of DHCP deployment 6.6 ssh, Telnet, File Transfer Protocol (FTP), rsh 6.7 xinetd, tcp-wrapper, Working & Advantages	**10**
		Total Hrs.	**48**

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Unit	Hrs.
1.	Install LINUX operating system (Ubuntu / Fedora / Linux Mint) on standalone machine	Introduction	04
2.	Install RPM (Red Hat Package Manager) using pidgin		04
3.	Install Dual operating system with one as Linux OS (Other may be Windows)		04
4.	Develop and execute programs using vi editor	Vi Editor	04
5.	Use and execute Linux Commands such as touch, tail, where is, rpm, df, mount, fdisk, uname, shutdown, whoami, netconfig, chkconfig and ping	Linux Commands	04
6.	Develop and execute commands for the Net configuration of machine using net config		04
7.	Create partition using fdisk and use it		02
8.	Develop and execute commands for Creating user (each student is expected to create at least 3 users with different privileges)	Linux Operating System	02
9.	Develop and execute commands to Recover root password		02
10.	Install and configure Ubuntu Server OS for uploading the website already created.		04
11.	Apply different privileges for security (Permissions) in a network environment	Linux System Security	04
12.	Install and configure Firewall for the network security.		04
13.	Install and configure DHCP server	Server and Services	04
14.	Configure DNS, and Mail transfer agents POP3 and SMTP		04
15.	Develop commands (process) and perform Network Installation of Linux		04
16.	Install and configure Apache server (HTTP).		04
17.	Install and configure Samba Server & NFS		04
		Skill Assessment	02
		Total	64

❖ SPECIFICATION TABLE FOR THEORY PAPER :

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
1.	Introduction	02(02)	04(00)	00(00)	06(02)
2.	Vi Editor	02(00)	04(08)	04(00)	10(08)
3.	Linux Commands	02(02)	08(00)	06(06)	16(08)
4.	Linux Operating System	00(00)	06(04)	04(00)	10(04)
5.	Linux System Security	02(00)	04(04)	06(06)	12(10)
6.	Servers And Services	02(00)	08(08)	06(00)	16(08)
	Total	**10(04)**	**34(24)**	**26(12)**	**70(40)**

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER :

Q. No.	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			Option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	5	R	2	6	R	2	1	R	2	5/7
	3	R	2																
02	1	U	4	2	A	4	3	U	4	2	U	4	6	U	4				3/5
03	4	A	4	5	U	4	6	U	4	4	U	4	2	U	4				3/5
04	2	U	4	3	U	4	6	U	4	6	U	4	5	U	4				3/5
05	4	U	6	5	A	6	5	A	6										2/3
06	3	A	6	6	A	6	3	A	6										2/3

T=Unit/Topic Number L=Level of Question M=Marks

R=Remember U=Understand A=Analyze / Apply

❖ ASSESSMENT AND EVALUATION SCHEME

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	**CA** (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Theory Answer Sheets	1, 2, 3
				Total	**100**	**40**		
Direct Assessment Practical	**CA** (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	**25**	**10**		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**50**	**20**	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ SCHEME OF PRACTICAL EVALUATION

Sr. No.	Description	Max. Marks
1	Installation of Unix / Linux OS, Writing and executing Linux commands,	20
2	Configuring Apache server, samba server and NIS server	20
3	Viva Voce	10
	TOTAL	**50**

❖ MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**
1	-	3	-	-	-	-	1	-	-	-	3	3
2	-	3	-	-	-	-	-	-	-	-	3	3
3	-	3	-	-	-	-	-	-	-	-	3	3
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	3
6	-	3	3	3	-	-	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) Substantial (High)

❖ REFERENCE & TEXT BOOKS :

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Linux for Dummies	Richard Blum & Dee-Ann LeBlanc, Ninth Edition, Wiley Publishing Inc., 2009	13:978-0-470-46701-5
2.	The Complete Reference LINUX	Richard Peterson, Sixth Edition, Tat McGraw Hill,2008	13:978-0-07-022294-6

❖ E-REFERENCE

- http://www.tldp.org/LDP/sag/sag.pdf , accessed on 07th September 2016
- http://nptel.ac.in/courses/117106113/1 , accessed on 07th September 2016
- http://linux-training.be/linuxsys.pdf , accessed on 07th September 2016

❖ LIST OF MAJOR EQUIPMENTS / INSTRUMENTS WITH SPECIFICATION

1. Network Lab with all PC connected in LAN
2. Computers with Core2Duo and above with pre installed LINUX OS
3. 24 port Switches, Wifi Modems, Router

❖ LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:

S.N.	Name	Designation	Institute / Industry
1.	Mr. S.P. Lambhade	Head of Computer Engineering	Government Polytechnic, Nagpur.
2	Dr. Mrs. A. R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
3	Mr. M. A. Rahman	Lecturer in Computer Engineering	Govt. Polytechnic, Nagpur
4	Ms. D. P. Chanmanwar	Lecturer in Information Technology	Govt. Polytechnic, Nagpur
5.	Ms. I. G. Lokhande	Lecturer in Information Technology	Govt. Polytechnic, Nagpur
6	Mr. Manoj Jethwa	Head of Department in Computer Technology	Shri Datta Meghe Polytechnic, Nagpur
7.	Mr. N. V. Chaudhari	Asstt. Prof.- Computer Science and Engineering	DBACER, Wanadongri, Nagpur
8	Mr. Atul Upadhaya	Chief Executive Officer	Vista Computers, Ramnagar, Nagpur

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(Member Secretary PBOS) **(Chairman PBOS)**