Source book
For
Certificate Course in Linux System Administration

2015

Source book for Certificate Course in Linux System Administration **Batch** April 2015

1. **Course Objective:** The objective of this course is to provide the student with an expertise in Linux Administration.

2. **Eligibility Criteria:** Any Engineering /Science graduate with mathematics up to 10+2 level

3. **Prerequisite:** Candidate should have basic knowledge of computer, Operating system and networking fundamentals with logical approach.

4. **Teaching Schema:**

Sl. No.	Modules	Hours
1	Basic of Linux Administration	50
2	Fundamentals of Networking	40
3	System Administration	130
4	Management Development Program	60
5	Project	40
	Total	**320**

5. **Suggested Schedule**

Week	Teaching Sessions & Academic Activity
1	Basic of Linux Administration (30/50 Hrs)
2	Basic of Linux Administration (20/50 Hrs) And Fundamentals of Networking (10/40 hrs)
3	Fundamentals of Networking (30/40 hrs)
4	System Administration (30/130 hrs)
5	System Administration (30/130 hrs)
6	System Administration (30/130 hrs)
7	System Administration (30/130 hrs)
8	System Administration (10/130 hrs) And Management Development Program (10/60 hrs)
9	Management Development Program (30/60 hrs)
10	Management Development Program (10/60 hrs) **and** Project (20/40 Hours)
11	Project (20/40 Hours) **and** Exam Break 2 days)
12	1st Day – Exam, Two Days – Project Evaluation, 5th Day – Re-exam

6. **Session wise Breakup**
Note: Each single session is of two hours duration for all subjects mentioned below.

Basic of Linux Administration (26 T + 24 L hrs)

Session 1:
- Introducing Linux,
- History

Session 2:
- Installing Linux

Session 3:
- Distributions
- Devices and Drives in Linux
- File system Hierarchy

Session 4:
- Components: Kernel, Distribution, XFree86, Sawfish, Gnome.
- GNOME Basics. Changing the desktop background, adding menu items, plugins.
- Changing the screen resolution

Session 5:
- Evolution - the default e-mail client in Fedora.
- Mozilla - Web browser

Session 6:
- OpenOffice - Productivity tools. Word processor, spreadsheet, presentation software.
- gaim - Chat application
- XScreensaver

Session 7:
- How user preferences are stored in your home directory
- Updating your system with up2date / yum.
- How to restart X11: Ctrl-Alt-Backspace

Session 8:
- The command-line (shells, tab completion, cd, ls)
- file management: cd, df, find, locate

Session 9:
- nano, the text editor that replaces pico.
- man pages - the help system
- ssh - secure text-based connectivity to other machines. Demonstrate X-Forwarding.
- Handling compressed archives with zip and tar.
- GNU screen - The ability to resume command-line sessions from anywhere.

Session 10:
- Adding users, groups

- su - the obsoleted way to become the root user.
- sudo - the modern way to run processes as another user.
- Changing users' passwords with the passwd command.
- Printing with CUPS.

Session 11:
- Installing new software with yum (if Fedora) or YaST (if SUSE)

Session 12:
- Installing new software with rpm

Session 13:
- Installing webmin for easy web based systems administration

Lab Assignments:
- View the contents of a directory: A directory may contains visible and invisible files with different file permissions.
- Viewing blocks, HDD partition, External HDD
- Checking the integrity of Downloaded/Transferred Packages
- Converting and copying a file
- Know your machine name, OS and Kernel
- Viewing history
- Being root
- Make Directory
- Make Files
- Changing the file permission
- Own a file
- Install, Update and maintain Packages
- Uncompressing a file
- See current date, time and calendar
- Print contents of a file
- Copy and Move
- See the working directory for easy navigation
- Change the working directory
- Finding a file in a given directory
- Searching a file with the given keywords
- Finding online documentation
- See the current running processes
- Kill a running process, See the location of installed Binaries
- Starting, Ending, Restarting a service
- Making and removing of aliases
- View the disk and space usages, Removing a file and/or directory
- Print/echo a custom output on standard output
- Changing password of on-self and others, if you are root.
- View printing queue
- Compare two files
- Download a file, the Linux way (wget)
- Mount a block / partition / external HDD.

Fundamentals of Networking (20 T + 20 L hrs)

Session 1:

- Introduction to computer Networking
- Categories of Networking according to size (LAN,WAN,DAN,MAN)

Session 2:

- Types of connections
- Network classifications (Wired, Wireless)

Session 3:

- Overview of transmission media
- UTP/STP/Coaxial/Fiber-spec./advantages and disadvantage

Session 4:

- Network Hardware Devices (Hub, Switch, Modem, Router, Bridge, firewall etc)

Session 5:

- OSI Layer
- TCP/IP overview

Session 6:

- IP addressing, IPv6, Sub-netting, super-netting

Session 7:

- Planning and Implementing
- Architecture of Internet and intranet

Session 9:

- Port Security
- Spanning tree Protocol

Session 10:

- Troubleshooting

Lab Assignments:

- Write short notes on the basic concepts of how data networks and the Internet support business communications and everyday activities.
- Write short notes on the basic networking processes used to communicate across Local Area Networks, Wide Area Networks and the Internet.
- Operate basic networking devices and services used to support communications across an Internetwork.
- Write short notes on the layers of communications in data networks using the 7-Layer OSI and the 4-LayerTCP/IP models.
- Write short notes on the role of protocols in data networks.
- Write short notes on the importance of addressing and naming schemes at the following OSI Data Link, Network and Application layers.

- Write short notes on the protocols and services provided by the Application layer in the OSI and TCP/IP models.
- Write short notes on the functions and features of the Transport layer protocols and services.
- Write short notes on the functions and features of the Network layer protocols and services.
- Write short notes on the fundamental concepts of routing that occur when a packet is forwarded from its source to its destination across multiple networks.
- Write short notes on, calculate, and apply subnet masks and IP addresses to meet network design requirements.
- Write short notes on the operation of the OSI Data link layer protocols by explaining how data link frames communicate between networking devices.
- Write short notes on how the OSI Physical layer protocols and services transfer data bits across data networks.
- Write short notes on fundamental Ethernet concepts such as media, services, and operation.
- Configure Hub, Switch, Modem, Router, Bridge, firewall etc

System Administration (50 T + 80 L hrs)
Session 1:
- Installing Linux in server configuration
- Dual booting issues

Session 2:
- Managing software
- The RPM Package Manager
- Software Management in ubuntu

Session 3:
- Managing Users
- User Management tools
- User and Access permission

Session 3:
- Command Line
- Command Line shortcuts
- Documentation Tools
- File Management and Manipulation

Session 4:
- Booting and Shutting Down
- Boot Loader
- The init Process
- Enabling and disabling Services

Session 5:
- Makeup the file system
- Adding new disk
- Volume Management

Session 6:
- Compiling the Linux Kernal
- Finding the kernel source code
- Building the Kernel
- Patching the Kernel

Session 7:
- TCP/IP for System Administration
- TCP Connection
- Bringing IP Network Together

Session 8:
- Network Configuration
- Managing Routers
- How Linux Chooses an IP Address

Session 9:
- Firewall Linux
- Installing Netfilter
- Configuring Netfilter

Session 10:
- Local Security
- Common Source of Risk

Session 11:
- Network Security
- TCP/IP and Network Security
- Network Security Tools

Session 12:
- DNS
- Installing and configuration

Session 13:
- Apache Web server
- Installing, Starting, testing and configuring

Session 14:
- SMTP
- Understanding, Installing, Configuring

Session 15:
- POP and IMAP Basics

Session 16:
- Secure Shell SSH

Session 17:
- Overview of Network file system

Session 18:
- Overview of Network Information Service

Session 19:
- Samba
- Mechanics of SMB
- Samba Administration

Session 20:
- LDAP Basic
- OpenLDAP

Session 21:
- Printing Technologies
- CUPS system

Session 22:
- DHCP Server
- DHCP Client

Session 23:
- Virtualization Concepts

Session 24 and 25:
- Backups
- Evaluating Backup Needs
- Command Line Tools

Lab Assignments:
- logfiles. Using tail -f to watch /var/log/messages
- Configuring Kerberos authentication
- Explaining file permissions, including setuid.
- How to enable and disable services
- ntp - Setting up time synchronization
- Setting DNS settings by editing /etc/resolv.conf
- Changing XFree86 settings in /etc/XFree86/XFree86.conf

- **Apache and MySQL administration**
- About the Apache webserver.
- About the MySQL database engine.
- About the PHP scripting language.
- Enabling the Apache with PHP and MySQL services
- Using MySQL Administrator
- PHPMyAdmin - web based administration and query console for MySQL.
- Adding a MySQL user in phpmyadmin
- Installing WordPress - a popular blogging software that uses MySQL.

- Installing Coppermine - a popular photo gallery software that uses MySQL.

- **Windows Integration**
- Connecting to your Linux machine from Windows using PuTTY and WinSCP.
- WINE - free Windows API compatibility layer, for running Windows applications in Linux. We will use mIRC as a sample application.
- Samba basics.
- Configuring Samba to authenticate using ADS
- rdesktop - Windows Terminal Server Client.
- smbclient - an FTP-like client for SMB shares
- smbmount - Mounting samba shares to a local directory (explain mount)
- smb4k

- **Automation**
- cut - cutting out the good parts of your input
- sort - sorting files
- uniq - finding the unique lines in a set of input
- sed - searching and replacing
- tail, head
- find -exec - running a command on a large set of files
- Writing a shell script
- Scheduling tasks with cron.

- **System Administration**
- Mounting disks
- Killing processes with kill
- Fetching files with wget
- Compiling software: configure, make, make install, fstab
- Reviewing find and du for finding out where your disk space went to.
- Single user mode
- X: Networking Tools
- ping - check if a host is online
- traceroute - see your hops between hosts
- telnet - diagnostics
- nmap - seeing what ports are open on a host
- xinetd - the "internet super server". TCP/IP service manager.
- lsof - list open ports and files
- ethereal - Packet Sniffer Extraordinaire.

- **Customizing your user environment**
- symbolic links
- The Z Shell
- aliases, including -s types in zsh.
- variables
- PATH
- prompts
- Terminal transparency
- adding things to your X startup

Management Development Program (30 T + 30 L hrs)

Session 1:

- Introduction to communication,
- Barriers to communication, Kind of communication,
- Confidence building Non-verbal Communication

Session 2:

- Fluency and vocabulary
- Synonyms
- Antonyms
- Grammar, Noun Pronoun,
- Verb, Adjective, Preposition, Conjunction

Session 3:

- Words of Idioms & phrases
- Sentence Construction
  Pronunciation,

Session 4:

- Greeting,
- Conversation practice,
- Polite Conversation,

Session 5:

- Resume Writing,
- Covering letter,
- Email,

Session 6:

- Presentation Skill,
- What is group discussion?
- Interview skills, Mock interview

Session 7:

- Analogy, Series Completion (Number, Alphabet, Letter Series)
- Coding-Decoding for Number
- Alphabet and Letter
- Blood Relations

Session 8:

- Puzzle Test: Classification Type questions
- Compression Type questions
- Sequential order questions
- Section based on given conditions
- Questions involving family members

Session 9:

- Alphabet test
- Order of words
- Letter words problems
- Rule detection
- Alphabetical quibble
- Word formation
- Number
- Ranking
- Time Sequence Test

- Mathematical operations
- Logical sequence of words

Session 10:

- Arithmetic reasoning
- Logical reasoning
- Statement-Arguments
- Statement-Assumptions
- Statement-courses of Action
- Statement-Conclusions
- Deriving conclusion from passages

Session 11:

- General Aptitude
- Addition
- Multiplication
- Divisibility
- Squaring
- Cube
- HCF and LCM
- Fraction

Session 12:

- Number system
- Permutation & combination
- Probability
- Ratio & Preparation

Session 13:

- Partnership
- Percentage
- Average
- Problem on Ages
- Profit and loss

Session 14:

- Simple Interest
- Compound Interest
- Time and work
- Work and Wages

Session 15:

- Trains
- Streams Pronoun
- Alligation
- Clock
- Pipes and cisterns

Lab Practice:

Faculty needs to conduct GD, presentation for speaking, conducting mock interviews etc.

Faculty needs to conduct tests, Surprise tests, assignments etc.

7. List of Reference Books

Name of the Module	Title of the Book	Author/Publication	Edition	ISBN
Basic of Linux Administration And System Administration	Linux Administration A Beginner's Guide	Wale/ TMH	5th	9780070142602
	Linux Administration: A Beginner's Guide	Soyinka/ TMH	6th	9781259061189
	Linux Administration	Dream Tech	2012	9789350044209
	Linux Administration	O'Reilly Media	2007	9780596009526
	System Administration	Pankaj Sharma/ S K Kataria & Sons	2012	9789350143025
Fundamentals of Networking	Network Fundamentals CCNA Exploration Companion Guide	Dye /Pearson India	2008	9788131719824
	Networking Fundamentals: Wide, Local and Personal Area Communications	Wiley India Pvt Ltd	2014	9788126547388
	Computer Networks	Tanenbaum/Pearson	2013	9789332518742
	DATA COMMUNICATIONS AND NETWORKING	Forouzan/TMH	2003	9780070499355
Management Development Program	High School English Grammar & Composition Revised Edition	Wren, Martin / S. Chand Publisher	2011 Edition	9788121900096
	Communication Skills Publication Year 2011	Sanjay Kumar, Pushp Lata / Oxford University Press	2011 Edition	9780198069324
	Professional Communication Skills	Praveen S R Bhatia / S.Chand Publishing	2011 Edition	9788121920926
	Quantitative Aptitude For Competitive Examinations	R. S. Aggarwal / S. Chand Publishing	17th Edition	9788121924986
	A Modern Approach To Verbal & Non-Verbal Reasoning	R. S. Aggarwal / S.Chand Publishing	Year 2012 Edition	9788121905510
	How to Prepare for GD and Interview (With CD) 3rd Edition	Hari Mohan Prasad, Rajnish Mohan/TMH	2010	0070706344

8. Evaluation Guidelines

8.1. Evaluation

Evaluation is a necessary and essential part of conducting the C-DAC Certificate Course in Linux System Administration, as it provides important feedback and inputs to both the institute as well as the student. The institute gets an idea about the relative performance of each student, which also serves as feedback about the design and conduct of the programme. The student gets a clear picture of his academic standing, individually and in comparison to his fellow students.

In order to ensure timely and efficient evaluation and certification of all students, the following guidelines are being issued and should be followed religiously.

8.2. Evaluation Methodology

8.2.1 Each centre should have a Designated Responsible Member (DRM) for Evaluation.

8.2.2 The DRM Evaluation would be responsible for coordinating all activities relating to evaluation at the training centre and for communicating with CDAC ACTS, Pune.

8.2.3 Evaluation is a compulsory part of the process of obtaining Certificate Course in Linux System Administration. All students are required to pass in each subject of the course in order to be eligible to receive the C-DAC Certificate.

8.2.4 The faculty of every subject should outline the objectives of the evaluation to be conducted for that particular subject, so as to enable the student to prepare himself/ herself properly.

8.2.5 The performance of students is constantly evaluated through surprise quizzes, hourly examinations, assignments throughout the term, submission of term reports, presentations and final examinations at the end of the course.

8.2.6 Mode of exams will be in online / offline, but prior information will be given by C-DAC, ACTS about the mode of the exam and it will be final.

8.3. EVALUATION METHODS

8.3.1 Course End Evaluation

After completion of the all subjects, a written examination CEE (Course End Examination) will be held, which will test the knowledge of the students of each subject and it is a compulsory part of the evaluation. Conducting CEE involves performing duty with responsibility. A small mistake in the process may hamper the whole system. Everyone has to play their role in an effective manner. It is a joint effort work which has to be carried out in a combined way. Right from receiving question paper from ACTS, C-DAC to sending the OMR answer sheet (in case of offline exam) and the response file (in case of online exam) for evaluation dealt with lot of responsibility.

ACTS, C-DAC in its pursuit of excellence, believes in providing a congenial atmosphere to the students during all exams in order to get them to perform at their optimum level. However, there are certain norms which the students are expected to be aware of and observe both in letter and spirit. These norms are:

8.3.1.1 Impersonation may lead to permanent expulsion from the Institute.

8.3.1.2 Cell phones are strictly prohibited in the exam hall/room.

8.3.1.3 Valid ID card is mandatory for entry to the exam room / hall.

8.3.1.4 Punctuality is most important at all times. Students are expected to check their exam location and be seated at least 10 minutes prior to the exam time.

8.3.1.5 In case of offline exam, as per ACTS, C-DAC policy all question papers are to be returned along with the answer script.

8.3.1.6 Students are required to bring their own stationary as no lending or borrowing is permitted during examination.

8.3.1.7 Programmable calculators or any other kind of electronic devices are strictly prohibited inside the exam area.

8.3.1.8 Indiscipline in the exam hall/ room will not be tolerated.

8.3.1.9 Possession of any written material related to the subject or communication with their fellow students, will result in disciplinary actions.

8.3.1.10 A student must score a minimum of 40 percent marks, in order to successfully clear the course.

8.3.1.11 It is recommended that the students should ensure 100% attendance for each course. 10% absences are permissible, only in case of illness, or emergencies. These have to be approved by the Centre Head. Approval is contingent upon the evidence provided.

8.3.1.12 There will be 150 questions to answer in 3 hours duration in CEE as per the following distribution mentioned in Table – 1.

Table – 1

Sl. No.	Module Name	Hours	No. of Questions
1	Basic of Linux Administration	50	30
2	Fundamentals of Networking	40	25
3	System Administration	130	65
4	Management Development Program	60	30
5	Project	40	-
	Total	**320**	**150**

8.3.2 GENERAL GUIDELINES FOR AWARD OF GRADES:

The marks of obtained in the CCEE shall be calculated to get total marks out of 100. The rounding off shall be done on the higher side. The grades shall be awarded on the basis of cut off in the absolute marks, as mentioned in Table – 2.

Table 2

Lower range of marks	Grade	Upper range of marks
91	≤ A+ <	100
81	≤ A <	90
71	≤ B+ <	80
61	≤ B <	70
51	≤ C+ <	60
41	≤ C <	50
0	≤ F <	40

8.3.3 Guidelines of CEE:

CEE will be conducted normally before the commencement of Project work of the course. The written examination should be of 180 minutes duration. It should consist of objective questions. A typical objective type exam paper should contain the following types of questions: –

- Multiple choice
- Yes or No
- True or False

Objective questions are useful in testing the recognition and recall abilities of students. They also help in keeping the exam short and easier to evaluate.

For the pure objective type question papers, there will be 150 objective type questions with 4 maximum answer options having only one correct option. The value of each objective type question is of one mark only. There will not be any negative marks for the wrong answers given by the students.

8.3.4 Guidelines for setting Question Papers:

While setting the question papers for theory Exam the following weightages should be assigned as per the difficulty level of the questions.

Levels	Requirements	Weightage
Level A – Easy	Requires elementary knowledge which may be obtained by attending all lectures and completion of mandatory lab assignments	25%
Level B – Intermediate	Requires thorough study of all course material, attendance at all lectures and completion of mandatory assignments	50%
Level C – Difficult	Requires study and lab work beyond the prescribed course material and mandatory assignments	25%

8.4. Guidelines for generating questions:

8.4.1 Question paper setter has to use sample paper format provided by C-DAC, ACTS Pune

8.4.2 Mention the subject name without fail.

8.4.3 Language of the question should be easy to understand.

8.4.4 The answers must have relevant objective type choices and “only one” correct answer.

8.4.5 The questions must be prepared by referring appropriate books, reference books, reference material, and course material having good information.

8.4.6 The question must be created by the domain expert afresh and should not be copied directly from any book, website, existing previous question papers etc.

8.4.7 The question should be unique and should have not been published anywhere.

8.4.8 Please mention the source of the question wherever possible, as it may help us in referring the same for detailing if required.

8.4.9 The caliber of the question should suffice the growing need of competition.

8.4.10 The question paper should have questions covering the entire syllabus.

8.4.11 The questions have to be typed in MS Word with “Arial” having letter size 12 point. Do not bold any letter, word or sentence in any part of the question paper.

8.4.12 It is essential to give password to the word document and send/tell the password separately.

8.4.13 It is essential that utmost care is taken at your end to maintain the secrecy of the soft copy at all time.

8.4.14 An expert team will review all questions. The questions will be filtered as per following:

- If the question is incomplete
- If the answer of the question is wrong

- If the question is not there in the syllabus
- If the question appears more than once
- If the question is too lengthy
- If the question is irrelevant
- If the options to the questions are irrelevant

8.5. **Template for generation of Questions**

Date:

Question generated by: Mr. /Ms.

Subject Name:

Q. No.
Question: <Text of the question>

Answer Choices
A:
B:
C:
D:

Difficulty Level: Easy / Intermediate / Difficult

Reference: (Name of books)
(If question taken from book) (Mention name of the book, author, ISBN)
Total Number of Questions Generated: _____

8.6. **Template for Answer Key:**

Module name:			
Question No.	**Answer Keys**	**Question No.**	**Answer Keys**
1		|	
2		|	
3		141	
4		142	
5		143	
6		144	
7		145	
8		146	
9		147	
10		148	
|		149	
|		150	

8.7. **Evaluation of answer papers:**

For Offline mode: Use of OMR sheets will be useful for processing the result of multiple choice exams. OMR is an effective way to collect data, process for the result and also it

takes less time with greater accuracy in less effort. Centres need to follow the best way for scanning the OMR sheets, process the result and publish the result. Centres which are not using OMR can user OCR to conduct the exams and evaluate the students. Centre which are not using OMR or OCR can evaluate the students manually and process the result.

For Online mode: Course end exam will be through online s/w. Evaluation will be through that Exam s/w.

If a student requests for re-evaluation then the student has to pay `150 /- and it should be routed through training centre. The Re-evaluation fee should be paid to respective C-DAC training Centres, in case of Authorized Training Centres associated to C-DAC, Pune, payment to be made in favour of "C-DAC, ACTS" and payable at Pune. (This is applicable only for theory exam)

8.8. **Moderation:**

Grace marks would be awarded as per the methodology below:

5.1. Maximum of 4% of total term end theory exam marks can be awarded to a candidate.

S No.	Name of the course	Total Marks	Maximum grace marks for the course
1	Certificate Course in Linux System Administration	150	6

On completion of the moderation exercise the revised marks should be updated in the marks database.

8.9. **Re-examinations:**

The following conditions will be applicable for the course end re-exam:

6.1. Students who do not appear for an exam on the scheduled date will not have an automatic right to re-examination. Only those students who, in the opinion of the centre/course coordinator have a genuine reason for being absent may be allowed to appear for a re-exam.

6.2. Students who have failed an exam may be allowed to appear for a re-exam.

6.3. The re-exam should be conducted following the same process as the regular examination.

6.4. Students, who failed/remained absent in the Course End Examination conducted by C-DAC, shall be allowed to appear in the re-examination only once.

6.5. Students who remain absent or fail in the re-examination will not get any further chance for appearing for a third attempt or further. In such case the candidate can receive the Performance Statement and the certificate of participation without any grade.

6.6. On evaluation of their answer sheets 20% of the marks obtained by the students will be deducted (towards de-rating for re-examination) for arriving at the final score, i.e. in order to clear the module test the student has to score a minimum of 50% marks instead of 40%.

8.10. **Project Module:**

8.10.1. Project work should be start as soon as possible.

8.10.2. After that students should be ready with all mandatory documents with database design and then completion of all teaching modules they can do the project.

8.10.3. Performance in the Project module will be awarded in grade. The Project grade will be mentioned separately on the certificate & will have no effect on the overall grade obtained by a student.

8.10.4. Students may do industry-sponsored projects, but will be required to do the project work within the centre.

8.10.5. Evaluation of the Project module will take place as following:

8.10.5.1. Internal evaluation will be take place at mid of the module

8.10.5.2. External evaluation will take place at the end of the module

Based on both evaluations, final grade will be awarded & communicated to C-DAC ACTS, Pune

8.11. **Guidelines for Project Evaluation**

Evaluation of Project work needs to be carried out as per the following guidelines:

a. Literature study.
b. Submission of abstract for their colloquium/seminar/project work along with the references.
c. Submission of the detailed work report
d. Two presentations each for 15 minutes on the work done restricted to 15 – 20 slides followed by evaluation.
e. The evaluation for 100 marks will be splited up as follows:
   i. Literature survey – 10
   ii. Contents of the project work – 20
   iii. Contents Flow of Presentation – 15
   iv. Communication and Presentation Skills – 20
   v. Depth of Knowledge in the topic – 15
   vi. Viva Voce – 15
   vii. Attendance – 5
f. Soft copy of the presentation should be submitted to C-DAC, ACTS, Pune

8.12 Ensuring Security of Evaluation data/records:

8.12.1. Ensure that all data relating to evaluation of students is stored in a secure place that cannot be accessed by unauthorized personnel.

8.12.2. All question papers must be prepared and stored in a separate area specifically designated for the purpose.

8.12.3. Whenever any external faculty sets a question paper, ensures that he should follows the guidelines given by C-DAC ACTS Pune.

8.12.4. Ensure that only one copy of any question paper is prepared in physical (printed) form for review and revision.

8.12.5. When the question paper is finalized, print out one master copy and gets it signed by the paper setter, Reviewer and DRM Evaluation.

8.12.6. Prepare required number of photocopies of the question paper and store them in a safe and secure location before the exam.

8.12.7. The data relating to evaluation of students, such as soft copies of question papers and answer keys, student marks database and performance statements etc. must be kept in a separate domain/directory which is accessible only to authorized personnel. Ensure that the data is regularly backed up.

8.12.8. The question papers for the theory as well as the laboratory examinations at all the centres will be set by CDAC, ACTS Pune. The centres according to

guidelines provided by C-DAC, ACTS Pune, will conduct the evaluation of the laboratory and assignments locally.

Note: The Evaluation Guidelines, Rules and Regulations issued by C-DAC, ACTS – Pune from time to time shall be binding on all the centers and all the students. C-DAC, ACTS, Pune reserves the right to add, modifies or deletes any or entire contents of this document at any point of time without giving any notice. It's the responsibility of the centre coordinator to inform such changes to the students in form of a formal notice with a duly signed copy to C-DAC, ACTS, Pune.

9. **Requirements (S/W and H/W)**

Computing Facilities for C-DAC Certificate Course in Linux System Administration	
A. Servers	
1. Unix / Linux / Server	
2. Windows 2008 / Windows 2012	
3. Application / Dummy Servers Configured for various modules	
Severs Configuration	
1. Processor (min 3.2 Ghz)	
2. RAM (min 8 GB)	
3 HDD (min 500 GB)	
4. Network Card	
5. AGP Card with 4/8 MB VRAM	
6. 2 Serial ports, 1 parallel port, 104 Keys Keyboard.	
7. DVD RW Drive	
B. Clients Machines Configuration	
1. Processor (Min 3.2 GHz)	
2. RAM (Min 4 GB)	
3. HDD IDE / EIDE (min 250 GB)	
4. AGP-64 bit Card with 8 MB / 4MB VRAM	
5. PCI Network Card 10/100 Base T, UTP Ethernet	
6. Multimedia Kit	
C. Network	
1. 10/100 Base T UTP Hub(s)	
2. UTP CAT-5 Cabling with RJ-45 connectors	
3. UTP Patch Cables	
D. Communication and Internet	
1 Internet Access	
2. ISDN Connectivity	
3. Modem 512 KBPS	
E. Printers	
1. Laser Printer	
F. Additional Lab Equipments	
1. Amplified Speakers, Headphones & Mikes	
2. Hi-Lumen OHP	
3. Video Projector (XGA / SVGA Compatible)	
4. TWAIN Compliant Color Scanner	
G. Module Specific Software Environments, Operating Systems and Hardware	
Basic of Linux Administration	Suse, Fedora, Ubantu

Fundamentals of Networking	Hub, Switch, Modem, Router, Bridge, firewall etc
System Administration	Suse, Fedora, Ubantu

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