

Source book for Certificate Course in Network Security

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1. **Course Objective:** This course is aimed to provide skills on networking and its maintenance and will help the students to make carrier in Network management.
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: (Tabular format)

Sl. No.	Modules	Hours
1	Network Fundamentals	40
2	VMWare and vCenter Administration	60
3	Network Defense and Counter Measures	100
4	IT Infrastructure Management 4.0	80
5	Project	40
	Total	320

5. Suggested Schedule

Suggested Schedule for Network Security		
Week		
1	Network Fundamentals (25/40 Hrs)	
2	Network Fundamentals (15/40)	VMWare and vCenter Administration (10/40)
3	VMWare and vCenter Administration (30/40)	
4	Network Defense and Counter Measures (25/100)	
5	Network Defense and Counter Measures	
6	Network Defense and Counter Measures	
6	Network Defense and Counter Measures	
7	IT Infrastructure Management	
8	IT Infrastructure Management	
9	IT Infrastructure Management	
10	Project	Project (40 Hrs)
11	Course End Exam	
12	Project	Project Evaluation & Course End Re-Exam

Note: 25 hrs of training will be considered in one week.

6. Session wise Breakup:

Note: Each single session is of two hours duration for all subjects mentioned below and consider T as Theory and L as lab.

Networking Fundamentals (30T +10 L Hrs)

Session 1:

- ° Introduction to communication system & issues in computer networking °
 - ° NIC installation
 - ° TCP/IP utilities-IPconfig, ping, netstat, arp, nslookup, traceroute
 - °

Session 2:

- Overview of transmission media
- UTP/STP/Coaxial/Fiber-spec./advantages and disadvantage
- OSI layers
- TCP/IP models

Session 3:

- Functions/ protocols & devices at each layer

Session 4:

- Overview of LAN ◦
Ethernet ◦
Gigabit Lan ◦ Fiber
Enabled Networking

Session 5:

- Protocols & standards

Session 6:

- Overview of WAN
- Networking protocols

Session 7:

- Overview of wireless networking

Session 8 & 9:

- IPV4/IP
V6 ◦
Subnetti
ng ◦ NAT
◦ IPv6 encapsulation

Session 10 & 11:

- Static
routing ◦
Dynamic
routing ◦ Port
Mapping
◦ IPv6 Routing

Session 12 & 13:

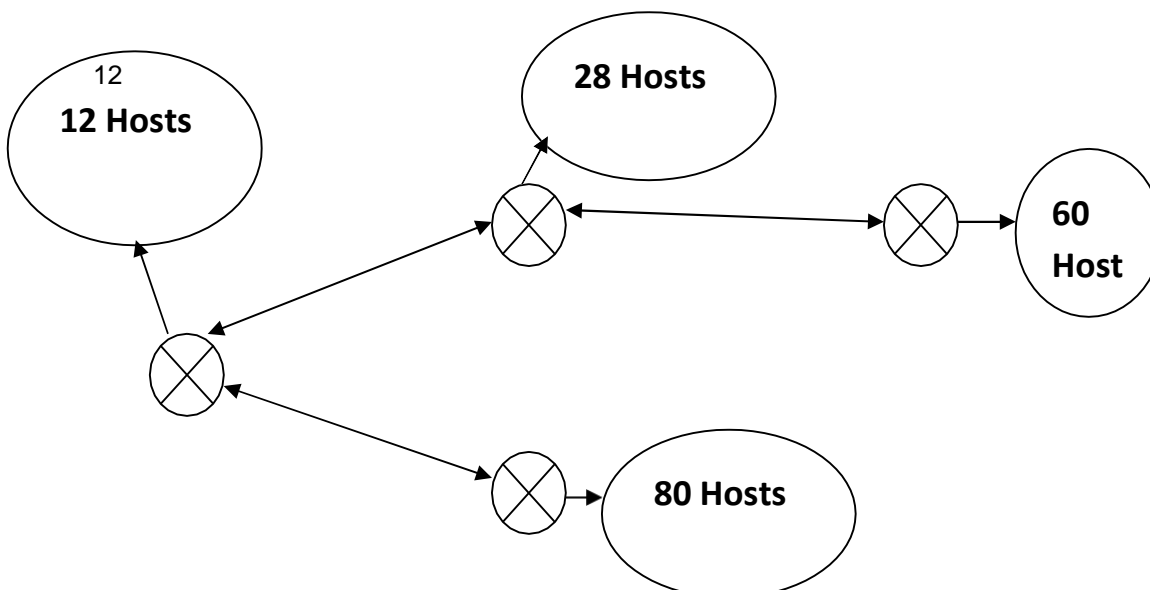
- ° Protocol headers for frame, TCP, UDP, IP ,RTMP
- ° Working of Hub, bridge, switch, router collision, UTM
- ° Planning and Implementing ° Architecture of Internet and intranet ° Port Security

Session 14 &15:

- ° Spanning tree Protocol ° Managing Traffic with Access Lists ° Troubleshooting

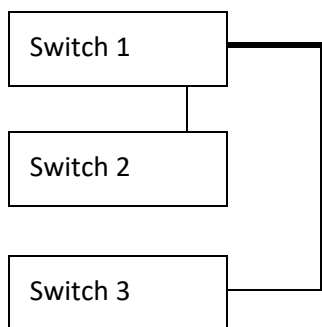
Assignments:

1 Solve the following subnetting example.



Consider the network address of **192.168.120.0 / 255.255.255.0** for the above example. Decide the subnet mask such that you get the required number of IP addresses at each location. Similarly for each router connection you have to use a subnet mask that gives only two host addresses.

2. Configure following switches for the required VLAN setup.



All the switches are 24 port switches.

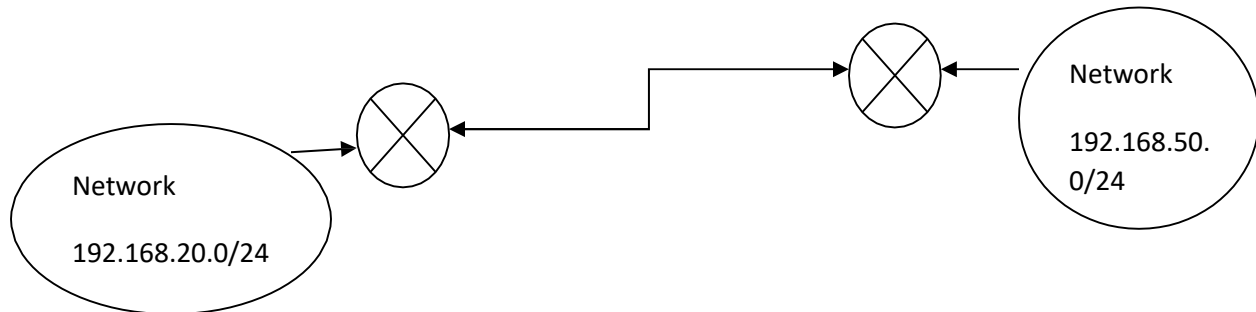
Port 24 on switch 1 is connected to port 24 on switch 3.
Port 23 on switch 1 is connected to Port 24 on switch 2.

Following is the desired VLAN configuration.

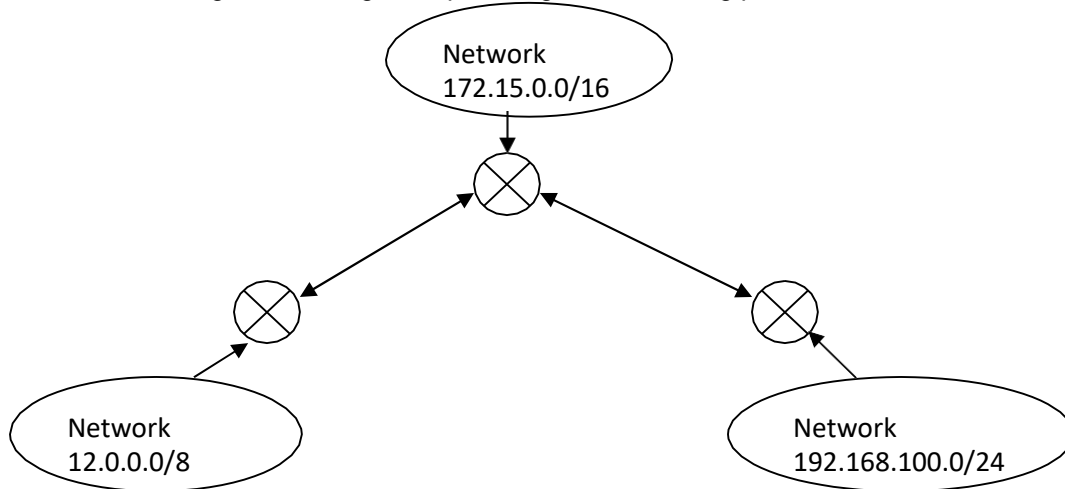
switch 3
switch 2

VLAN 1 – Contains port 1 to port 9 of all three switches. VLAN 2 – Port 10 to port 20 on switch1 / Port 10 to port 23 on switch 3
VLAN 3 – Port 21 and port 22 on switch 1 / Port 10 to port 23 on switch 2

3. Configure following example using static routing.



4. Configure following example using EIGRP routing protocol.



Complete VMWare vSphere ESXi and vCenter Administration (40T+40L Hrs)

- Introduction
- Course Syllabus
- Download Syllabus option
- What is Virtualization?
- How Virtualization Works?
- Basic Virtualization Terms
- Benefits of Virtualization

- Virtualization Technology Companies
- Difference Between Virtualization and Cloud
- Quiz, handouts and homework
- What is VMWare?
- VMWare Products (Player, ESXi, vSphere, etc.)
- Importance of VMWare
- Quiz, handouts and homework
- Lab Design
- VMWare Online Lab - Virtualization 101
- Download and Install VMWare Player
- First VM on VMWare Player (Linux)
- Download and Install ESXi Server (Hypervisor)
- Configure ESXi Server
- Connect to ESXi and Explore vSphere Dashboard
- Quiz, handouts and homework
- First VM on ESXi • Install Linux OS
- VM Management
- Update ESXi hostname
- Install Windows on a VM
- Install VMWare Tools
- Review VMs and Modify Resources
- VM Snapshots
- Quiz, handouts and homework
- Install 2nd ESXi Server
- What is vCenter?
- Downloading vCenter and Installation Options (Win32 UI or OVA)
- Install vCenter
- Accessing vCenter (Flash/HTML, SSH, Console, Admin Portal)
- vCenter Management Interface

- Create a Datacenter and Add ESXi Servers
- Managing hosts on vCenter
- Quiz, handouts and homework
- vCenter Homepage
- Getting Started and Summary
- Monitors
- Configure, Permissions and Datacenters (Menu)
- Hosts & Clusters and VMs
- Other Menu Options
- Accessing vCenter through HTML5
- Quiz, handouts and homework
- Migrating VM without VMWare cluster (Cold)
- vMotion
- VMWare Cluster
- High Availability - (Introduction)
- High Availability - Part 1 (Linux Installation)
- High Availability - Part 2 (Setup NFS)
- High Availability - Part 3 (Mount NFS and Migrate VMs)
- High Availability - Part 4 (Setup Cluster and Configure HA)
- Distributed Resource Scheduler (DRS)
- Sequence of Starting and Shutting VMWare vSphere Environment
- Datastore clusters
- Quiz, handouts and homework
- VM Cloning
- VM Templates
- VM Export and Import (OVF)
- Organizing VMs

- Other Menu VM Options
- Fault Tolerance
- Quiz, handouts and homework
- ESXi Command Line (CLI)
- VMWare vCenter Converter
- VMWare vRealize Operations
- VMWare vRealize Automation
- VMWare Horizon
- VMWare Community and Resources

Bonus

Network Defense and Countermeasures (44 T + 56 L Hrs

Session 1 & 2:

- Introduction to Information Security
- Why Information Security?
- Security: The money factor involved
- Internet Statistics - Study from a security perspective
- Vulnerability, Threat and Risk
- Qos

Session 3:

- Risk Management, Exposure and Countermeasure
- Firewall
- De-militarized Zone
- Two methods of implementing firewall
- Firewall type

Session 4 & 5:

- Packet Filtering
- Screened Host Firewall
- Bastion host
- Stateful Inspection Firewall
- iptables - Linux Firewall
- TMG Threat Mangement Gateway

Session 6:

- Wireshark
- Create a filters for data collection and display
- Examine real-world packet captures

Session 7 & 8:

- Linux Software Firewall(ClearOS / Untangle)
- Nginx & Squid Reverse Proxy
- UTM
- VPN – Introduction

Session 9 & 10 :

- VPN protocols/characteristics
- VPN Functions
- Types of VPN
- SecureVPN
- Trusted VPN

Session 11:

- Hybrid VPN
- IPsec
- Tunnel mode/transport mode
- Ipv6 VPN

Session 12:

- HMAC
- Crypto Choices
- VPN Implementation using L2TP/PPTP

Session 13:

- IDS / IPS
- Types of Attacks

Session 14:

- IDS
- Security Events
- Vulnerability/design/implementation

Session 15:

- Attacks-traditional/distributed
- Intruder types
- Introduction to IDS and IPS

Session 16 & 17:

- Types of IDS
- IPS categories
- Defence in depth

Session 18:

- IDS and IPS analysis scheme
- Detection methodologies
- Principles of IDS

Session 19:

- Symptoms of attacks
- Tired architecture
- Sensors-network/host based
- Denial of services
- DDos

Session 20:

- Sensor Deployment
- Agents
- Functions of IDS agents

Session 21:

- IDS manager
- Nigios

Session 22:

- Testing Snort
- IDS architecture
- Bypassing an IDS

Assignments:

1. Implement Iptables / netfilter and verify iptables / netfilter
2. How rule Processing is done in iptables
3. Specify Default Policy
4. Setting up a SPI Firewall - Standard installation
5. Do lab practice by Automating iptables and scripting
6. Write Bash Scripting to automate iptables
7. Threat Management Gateway(TMG) Installation & Configuration
8. Installation on Windows 2012 Server
9. Client Share Installation
10. Network monitoring using Wireshark
11. Examine real-world packet captures
12. How to do Server Farming?
13. Demonstrate OpenVPN configuration
14. Describe Certificate & Password dependent authentication
15. How VPN configuration done for Mobile Device
16. Clear OS - Installation and Configuration
17. Installation of Clear OS and Basic
18. UTM Configuration
19. Basic Setup of UTM
20. Configuration for access control and Firewall features (UTM)
21. How to do UTM VPN Configuration
22. Implement VPN Configuration under Windows 2012 using RRAS
23. L2TP/PPTP VPN Setup
24. Configuring TMG (Windows) as an IDS
25. installation, verification and basic usage of tcpdump
26. Writing Basic Snort Rules
27. Testing of Snort using a simulated attack
28. Nigios Sensor Configuration (Windows & Linux)

IT Infrastructure Management (40 T + 40 L)

Session 1 & 2:

Service Strategy

- general strategy
- competition and market space
- service provider types
- service management as a strategic asset
- key process activities,
- financial management

-
- service portfolio management
- demand management
- key roles and responsibilities of staff

Session 3:

Service Design

- design of architecture, processes, policies, documentation, and allowing for future business requirements
- Service Design Package (SDP),
- Service catalog management,
- Service Level management,

Session 4:

Service Design(Contd..)

- designing for capacity management,
- IT service continuity,
- Information Security,
- supplier management,
- and key roles and responsibilities for staff

Session 5:

Service Transition

- Service Asset and Configuration Management
- Transition Planning and Support
- Release and deployment management
- Change Management
- Knowledge Management
- key roles of staff

Session 6:

Service Operation

- balancing conflicting goals (e.g. reliability v cost etc),
- Event management,
- incident management,
- problem management,

Session 7:

•
Service Operation(Contd..)

- event fulfillment, asset management,
- service desk,
- technical and application management,
- as well as key roles and responsibilities for staff

Session 8 & 9:

Continual Service Improvement (CSI)

- training and awareness,
- ongoing scheduling,
- roles created,
- ownership assigned,
- and activities identified in order to be successful

Session 10 & 11:

Introduction

- Data center Architecture
- Data center Requirements
- Data center prerequisites
- Required Physical Area for Equipment and Unoccupied Space
- Required power to run all the devices
- Required cooling and HVAC
- Required weight
- Required Network bandwidth
- Budget Constraints
- Selecting a Geographic Location
- Safe from Natural hazards
- Safe from Man made disaster
- Availability of local Technical talent
- Abundant and Inexpensive Utilities Such as Power and Water
- Selecting and Existing building
- Characteristics of an Outstanding Design
- Guidelines for Planning a Data Center
- Data Center structures
- Raised Floor Design and Deployment
- Design and Plan against Vandalism

Session 12 & 13:

Infrastructure in a data center

- Modular Cabling Design

-
- Points of Distribution
- ISP Network Infrastructure
- ISP WAN Links
- Network Operations Center
- Network Monitoring
- Data-center physical security
- Data center Logical security
- Data center cleaning
- Reasons for data center Consolidation
- Consolidation opportunity
- Server consolidation
- Storage Consolidation
- Network Consolidation
- Service Consolidation
- Process Consolidation
- Staff Consolidation
- Data Consolidation phases
- Data center servers
- Server Capacity Planning
- Disaster recovery

Session 14:

Server Security

- Security Guidelines
- Unix Security Guidelines
- Internet Security Guidelines
- Internet security
- Source Security Issues
- Best Practices for System Administration
- System Administration Work Automation

Session 15:

- Cluster Architecture
- Cluster Requirements

Session 16:

Virtualization

- Introduction of virtualization
- LXC, Docker, Vagrant, kvm, Hyper v, Bare-metal
- Introduction Virtual Private Cloud (VPC) Setup

Session 17:

Storage area network

-
- Configuring a SAN (FreeNAS)
- Using SAN for high availability
- ZFS Volume Configuration
- IP-Based Storage Communication

Session 18:

- Bootstrapping Chef/puppet Server

Session 19:

- Centralized logging
- nagios
- Statsd
- Graphite
- Ganglila
- Load testing (proving you can handle more traffic)
- Identifying bottlenecks

Session 20:

- Auto-scaling Auto-rebuilding old instances
- Updating without downtime
- Auto-healing

Assignments:

1. What is the expected use of Service Strategy for IT Organizations?
2. Explain the relationship between Quality of service and cost of service
3. Mention the 3 broad categories of an event? Explain with at least two examples each
4. Write a brief about the Deming Cycle
5. What is the importance of a baseline in Continuous Service Improvement?
6. Which steps in 7 step Improvement Process support the CSI? Explain all the steps
7. Explain the complete Incident Lifecycle
8. What is CAB and who are the main Attendees of a CAB?
9. What are the types of changes? Give an example scenario for each.
10. What are the main types of Releases covered in ITIL V3? Give an example of each type.
11. How to create and deploy & migrate machine in vmware
12. Define Scalability. What are advance management applications that enable clustering.
13. What is SLA and create a note on base requirement to meet tier 4 data center standard.
14. What is the difference of standard data center in respect of classical data warehouse?
15. Configure SAN.
16. Implement various techniques for virtualization

7. List of Text/Reference Books:

Name of the Module	Title of the Book	Author/Publication	Edition	ISBN
IT Infrastructure Management	Service Management : Operations, Strategy, Information Technology	Mona J. Fitzsimmons, James A. Fitzsimmons/TMH	Latest	9780070615663
	Storage Networks: The Complete Reference	Mcgraw Hill Education	Latest	9780070532922
Networking Fundamentals	Networking Fundamentals: Wide, Local and Personal Area Communications	Kaveh Pahlavan, Prashant Krishnamurthy /Wiley India Pvt Ltd	2014	9788126547388
	Computer Networks: Principles, Technologies And Protocols For Network Design	Natalia Olifer/Wiley	latest	978-8126509171
Network Defense and Counter Measures	TCP/IP Network Administration	Craig Hunt/Shroff Publishers And Distributors Pvt.ltd	3rd	9788173664670
	Network Defense and Countermeasures	Easttom/Pearson Education	Latest	9780789750945
	Cryptography & network Security : Principles And Practices, 4/e	William Stallings/Pearson	latest	9788177587746

8. Evaluation Guidelines

8.1. Evaluation

Evaluation is a necessary and essential part of conducting the C-DAC Certificate Course in Network Security 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 C-DAC Certified Network Administrator certificate. 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.	Modules	Hours	No. of Questions
1	Networking Fundamentals	40	20
2	IT Infrastructure Management	80	45

3	Network Defense and Counter Measures	100	55
4	Complete VMWare and vCenter Administration	60	30
5	Project	40	Grade
	Total	300	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		150	
4			
5			
6			
7			
8			
9			
10			

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 use 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:

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

Sr. No.	Name of the course	Total Marks	Maximum grace marks for the course
1	C-DAC Certificate Course in Network Security	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:

8.9.1. 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.

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

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

8.9.4. 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.

- 8.9.5. 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.
- 8.9.6. 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 split 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.

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 Compliance Form For Network Security	Yes/No
A. Servers	
1. Unix / Linux Server	
2. Windows Server 2012	
3. Servers configured for various modules	
Servers Configuration (Please write specifications)	
1. Processor (min 3.2 Ghz)	
2. RAM (min 4 GB)	
3 HDD (min 500 GB)	
4. Network Card	
5. 4 USB , optical mouse, us Keyboard	
6. DVD Drive	
B. Clients Machines / Network Nodes	
1. Processor (Min 3.2 Ghz)	
2. RAM (Min 2 GB)	
3. HDD , SATA/ IDE (min 250 GB)	
4. PCI Network Card 1Gbps, CAT 5 Ethernet	
5. Multimedia Kit	
C. Network	
1. Gigabit Switch	
2. CAT-5 Cabling with RJ-45 connectors	
3. Patch Cables	
D. Communication and Internet	

1 Internet Access		
2. DSL /fiber line		
3. Minimum required bandwidth 1Mbps		
E. Printers		
1. Laser Printer		
F. Additional Lab Equipments		
1. Amplifier Speakers, Headphones & Mikes		
2. Hi-Lumen OHP		
3. Video Projector (SVGA/HDMI/ Svideo Compatible)		
4. TWAIN Compliant Color Scanner		
G. Module Specific Software Environments and Operating Systems		
Network Fundamentals	Wire shark	
Network Defense and Counter Measures	nmap GNS Symantec Ghost SNMP enumeration tool netcat putty WinSCP	
H. Operating System Software Common For all Course modules		
1. For Windows platform– Windows 2012 Server / Windows8		
2. For Linux platform– RedHat Linux 7		