

DOEACC CERTIFIED NETWORK ASSOCIATE  
(DCNA)

Curriculum

DOEACC CENTRE, CALICUT

**DOEACC CERTIFIED NETWORK ASSOCIATE (DCNA)**

Theory: 150 Hours.  
Max Marks (Theory): 100

Theory Paper: **Networking Fundamentals**

**1. Basics of Networking**

**24 Hrs**

Need of networking, brief history, Concepts of Analog and Digital signals, Binary arithmetic for networking. Network Elements: LAN, WAN, Host, Workstation, Server, Peer to Peer, Client/Server architecture. Physical Topologies: Bus, Star, Ring, Mesh. Backbone and Segments, Selection of the right topology.

Concepts of Bandwidth and Throughput Physical Media – Coaxial, Twisted-Pair and Fibre-Optic. Characteristics of the cable standards ( speed, length, topology and cable type).

Network Connectivity devices: NIC, Hub, Switch, Bridge, Router, Gateways, Modems, ISDN TAs, Wireless access points, Firewalls and UTM's

**2. Concepts of Layering.**

**6 Hrs**

The OSI Reference Model: Lower, Middle and Upper Layers. Networking protocols – TCP/IP, IPX/SPX, NetBEUI.

**3. Fundamentals of TCP/IP**

**15 Hrs**

Brief History, TCP/IP vs OSI Model, TCP, IP layer protocols, Application protocols. Common Application protocols – SMTP, POP3, IMAP, FTP, HTTP, HTTPS, NFS, SMB/CIFS, SSH, NTP, LDAP.

IP Addressing: Ethernet Address, IP address, Classes, Subnets, CIDR, concepts of routing, Private IPs.

**4. Internetworking with TCP/IP**

**15 Hrs**

IP Classes, CIDR, Subnets, Private IPs, Routing., Name Resolution.

Configuration of TCP/IP on Windows. Connecting to the Internet using a modem.

TCP/IP Utilities ( in windows and Linux ) tracert/traceroute/mtr, ping, arp, telnet, netstat, nbtstat, ipconfig/ifconfig, mii-tool/ethtool, winipcfg, nslookup/host/dig

**5. Network Operating Systems and applications**

**15 Hrs**

Features of Microsoft Windows ( 98, 2000 and XP) and Linux. Basic Network

configuration of Windows (2000/XP) and Linux in a LAN - Setting up IP address and configuring file sharing.

Networking client applications – Web Brower ( Internet explorer and Firefox) , Mail client ( MS Outlook, Moillza Thundirbird and Evolution ), ftp client (gftp) and Instant messengers ( Yahoo Messenger, Gaim ).

Features of Novell Netware and Macintosh OS

**6. Ethernet and Wireless Networks 15 Hrs**

Building an Ethernet network - SOHO and Enterprise scenario, General considerations, Structured cabling, selection of devices and media, costing, broad specifications of devices for both fiber and copper media, tools required for cabling, testing, case study.

Wireless Networks – General Characteristics of 802.11, Infrared and Bluetooth. Factors affecting the range and speed of wireless service.

**7. WAN and Remote Access Technologies 12 Hrs**

Basic characteristics of ( speed, capacity and media) of : Packet switching, Circuit Switching, ISDN, FDDI, T1, T3, OC-x and ATM.

Basic characteristics of Internet access technologies – xDSL, Broadband Cable, POTS/PSTN, Satellite and Wireless.

Functions of Remote Access Protocols – RAS, PPP, SLIP, PPPoE, PPTP, VPN, RDP and XDMCP.

**8. Network Access and Security 24 Hrs**

Concepts of Authentication and Authorization.

Purpose and functions of security protocols : IPsec, L2TP, SSL, WEP, WPA and 802.1x  
Identification of authentication protocols: CHAP, PAP, RADIUS, Kerberos and EAP.

Identification of common network protocols and related ports, peer and server services. Need of a firewall and Proxy. characteristics.

Purpose and characteristics of disaster recovery.

Fault Tolerance and Disaster Recovery – Need of antivirus, fault tolerance on Power, Link, Storage and Services.

**9. Network Performance Monitoring and Troubleshooting 9 Hrs**

Connectivity issues, Operating system related issues. SNMP Concepts, Managed switches, Network monitoring. Concepts of VLANs.

## **DCNA – References**

### ***Main Reading:***

1

Title: NETWORK + STUDY GUIDE  
Authors: DAVID GROTH, TOBY SKANDIER.  
Publisher: BPB, NEW DELHI

2.

Title: CCNA: Cisco Certified Network Associate Study Guide, 5th Edition (640-801)

( First Three Chapters only )

Author: Todd Lammle

Publisher: Sybex Inc.

### ***Supplementary Reading:***

1.

Title: CISCO NETWORKING ACADEMY PROGRAM: CCNA 1 AND 2  
COMPANION GUIDE

Author: CISCO SYSTEMS, INC.

Publisher: DORLING KINDERSLEY (INDIA), DELHI

2.

Title: CCNA CISCO CERTIFIED NETWORK ASSOCIATE STUDY GUIDE: EXAM  
640 – 801

Author: RICHARD DEAL

Publisher: TATA MGH, New Delhi

3.

Title: MCSA/MCSE SELF - PACED TRAINING KIT: MANAGING &  
MAINTAINING A MICROSOFT WINDOWS SERVER 2003 ENVIRONMENT  
EXAM 70 - 290

Author: DAN HOLME, ORIN THOMAS

Publisher: PHI, NEW DELHI

4.

Title: MCSE Training Kit (Exam 70-270): Windows® XP Professional

Author: Microsoft Corporation

5.

Title: Linux+ Study Guide

Author: Roderick W. Smith

Publisher: Sybex Inc.

6.

Title: INTERNETWORKING WITH TCP/IP. VOL. I: PRINCIPLES, PROTOCOLS,  
AND  
ARCHITECTURE

Author: DOUGLAS E COMER

Publisher: ADDISON WESLEY LONGMAN (SINGAPORE) PTE LTD., DELHI

For Windows and Linux configurations, refer the Operating system help and online manuals.

## DCNA Lab Exercises

### Unit 1: Basics of Networking

1. Identify the key specifications of the following network connectivity devices:
  1. Hub
  2. Switch
  3. Network interface card (NIC)
  4. Modem

### Unit 4: Internetworking with TCP/IP

1. Establish connection between two windows ( preferably XP ) PCs using TCP/IP, by assigning class C private IPs on both. Use ping command to test the connectivity.
2. Connect your Windows PC to Internet using a Dial-up modem. Identify your PC's public IP address using ipconfig/ifconfig command. Ping known Internet IPs or hosts( like [www.google.com](http://www.google.com), [www.sancharnet.in](http://www.sancharnet.in) etc.) to test the connectivity.
3. Setup a simple router with Windows or Linux, with minimum two NICs and static routing. To test the connection, “ping” from a PC in one subnet to another PC on another subnet through the router.
4. Learn the basic functionalities of the following networking related commands.
  1. On windows:
    - ipconfig,winipcfg,tracert,nslookup,ping,arp,netstat,nbtstat
  2. On linux
    - ifconfig,netconfig ( if available in your linux distribution), traceroute,mtr,ping,arp,netstat,mii-tool or ethtool,nslookup/host/dig

### Unit 5: Network Operating Systems and Applications

1. Establish file sharing between two windows PCs ( peer-to-peer, with TCP/IP ). Understand the various File Sharing Security features on Windows XP.
2. Configure the following applications:
  1. Web Browser ( Internet Explorer or Mozilla Firefox)
  2. Mail Client ( MS Outlook Express or Outlook or Mozilla Thunderbird or Evolution)
  3. FTP Client ( CuteFTP or gftp)
  4. Instant Messengers ( Gaim or Yahoo Messenger )

### Unit 6: Ethernet and Wireless Networks

1. Identify the tools required for structured cabling.( UTP based ).
2. Using Enhanced CAT5 UTP Cable, RJ 45 Connectors, and a crimping tool, make the following:
  1. A cross cable ( for connecting two PCs )
  2. A straight cable ( for connecting a PC with Switch/Hub )
3. Setup a small LAN with the following, and check the connectivity using ping command:
  1. Computers – 3 Nos
  2. Patch cords – 3 Nos
  3. Switch/Hub – 1 No
4. Setup wireless LAN connectivity between two PCs.
5. Interconnect a Wireless LAN with Ethernet LAN using:
  1. Wireless Access Point ( You may use a PC configured as a Bridge for this )
  2. A PC with two NICs ( One Ethernet 10/100 NIC and one Wireless NIC ). The PC should act as a router, and assume that wireless and wired networks are in separate IP subnets.
4. Prepare a network diagram, and specifications for actives(Switches, Wireless access points

etc.) and passives ( cable, connectors, patch panel, Information outlet etc.) for setting up a LAN in an office with 3 departments and 20 computers in each. Assuming that the distance between the departments is 25 Meters ( from each other). No outdoor cabling is required. All 60 computers should come in the same broadcast domain. Prepare separate diagram and specification for the following scenarios:

1. 10/100 Ethernet
2. Gigabit Ethernet
3. Wireless LAN in one department.
5. Setup Bluetooth network between two PCs, and transfer files between them. (Use Bluetooth dongle for connectivity)

#### **Unit 7: WAN and Remote Access Technologies**

1. Using any RDP Client, configure a connection to Windows 2000/2003 Server. You can use Remote Desktop Connection (mstsc.exe) on windows XP, rdesktop or tsclient on Linux etc.
2. Using any XDMCP Client, configure a connection to Linux Server. You can use X server programs for windows, like Xming, WinAxe etc.

#### **Unit 8: Network Access and Security**

1. Join a Windows XP PC to Active Directory. Login on the Windows XP PC with different users available in Active Directory.
2. Give Printing permission to a few users of Active Directory, and test the authorization scenario.
3. Learn the default firewall mechanism in Windows XP/2000. Test the setup after closing/opening common TCP Ports on the firewall.
4. Setup a proxy server on a Windows PC and share Internet connection. You can use any simple proxy server package.
5. Setup Network Address Translation ( Internet Connection Sharing) on Windows, and share the Internet connection.
6. Install an Antivirus package on Windows PC. Enable Realtime protection, Update the antivirus with the latest virus definition files.

#### **Unit 9: Network Performance Monitoring and Troubleshooting**

1. Enable SNMP in Windows Server, and using an MIB Browser, monitor the server.
2. Identify the connectivity issues using the commands mentioned in Unit 4.
3. Monitor the Network activities using a Hub and sniffer software. You can use Ethereal, ntop etc. Create a flooding scenario, identify the source of flooding and isolate the PC.

## DCNA – Infrastructure required for Lab

### **Infrastructure Required (Hardware):**

1. Server Computer 1 no.  
CPU Pentium 4  
Memory 512 MB  
Hard disk 80/120GB  
CD ROM drive  
Network Interface card 100/1000 mbps
2. An 8/16/24 Port Switch
3. 16 nos Straight through Cable
4. 3 Cross Cables
5. Client PC 4 nos  
CPU Celeron 1 GHz and above  
Memory 256 MB  
Hard disk 40/80 GB  
NIC 100/1000 MB
6. Internet Connection  
Modem: 56 kbps Or ADSL modem

### **Optional Hardware**

1. Bluetooth dongle
2. IR dongle
3. Wi-fi adapter
4. Wi-fi NIC cards

### **Infrastructure Required (Software):**

1. Windows 2000 server
2. Windows 2000 professional / Windows XP  
FTP server, SMTP Server  
Terminal Server (RDP server)  
DHCP server  
DNS server  
Web servers  
Web Browsers  
Software Router  
IP address Calculators  
Yahoo Messenger  
Gaim (Optional)  
A dial up connection or a broad band connection  
Antivirus  
Microsoft Outlook  
Terminal Client Software  
Firewall Software  
MIB browsers  
WMI services

## DCNA - Sample Questions

### Unit 1:

Which of the following can the network administrators use to segment the LAN.

- a. Hubs
- b. Repeaters
- c. Switches
- d. Bridges
- e. Routers
- f. Media converters
- g. All of the above.

Answers: c,d,e

### Unit 2

If the host on a network has the address 172.16.45.14/30, what is the address of the sub network it belongs to?

- a. 172.16.45.0
- b. 172.16.45.4
- c. 172.16.45.8
- d. 172.16.45.12
- e. 172.16.45.18

Answer d

### Unit 3

If the MAC address of your PC is C9-3F-32-B4-DC-19, what is the address portion of the OUI of the NIC card. Express as binary numbers

- a. 11001100-01111000-0001101
- b. 11001100-01111000-1001100
- c. 11001100-01111000-0001100
- d. 11001100-01111000-0001100
- e. 11001100-01111001-0001100
- f. 11001101-01111001-0001101

Answer d

### Unit 4

TLD server means

- a. Top level directories
- b. Top level dictionaries
- c. Top level domain
- d. Totally latent domains
- e. Tope level data

Answer c

### Unit 5

To boot up a from an OS installation disk From CD we have to

- a. make the CD bootable

- b. Change the boot order priority in the BIOS and set it to CD.
- c. When hard disk is present this is not possible
- d. None of the above

Answer b

#### Unit 6

The wifi 802.11b can achieve a maximum of

- a. 2 MBPS
- b. 5 MBPS
- c. 11 MBPS
- d. 54 MBPS
- e. 100 MBPS

Answer c

#### Unit 7

What is RDP?

- a. It's a protocol used for web communication
- b. Remote Desktop Protocol.
- c. It's a protocol used for accessing emails
- d. It's a protocol used for windows management.
- e. None of the above

Answer b

#### Unit 8

NAT stands for

- a. Networking and Truncking
- b. Network Addressing and Transportation
- c. Network Address Translation.
- d. Network Anchoring Translation

Answer b

#### Unit 9

What is SNMP?

- a. It's a protocol used for network management
- b. It's a protocol used for sending emails
- c. It's a protocol used for receiving emails
- d. It's a protocol used for encryption

Answer: a