Sample Paper
FINALTERM EXAMINATION
Fall 2023
CS610 - Computer Networks

Time: 60 min
Marks: 40

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CS610 Computer Network

Question No. 1

What is a virtual circuit in ATM?

a) A physical connection between two endpoints
b) A logical connection between two endpoints
c) A virtual path through the network
d) A virtual connection between two physical connections

Question No. 2

What type of virtual circuit is established in ATM before data transmission?

a) Permanent Virtual Circuit (PVC)
b) Switched Virtual Circuit (SVC)
c) Dynamic Virtual Circuit (DVC)
d) Temp Virtual Circuit(TVC)

Question No. 3

What are the advantages of private ownership of an ATM network over public ownersh?

a) Increased government regulation and oversight
b) Better utilization of network resources
c) Flexibility in network management and design
d) Improved network security and privacy

Question No. 4

What is the primary characteristic of a public network?

a) Restricted access to a specific group of users
b) Owned and operated by a government entity
c) Open and accessible to everyone
d) Low level of security and privacy measures

Question No. 5

What is an example of a connectionless network?

a) ATM (Asynchronous Transfer Mode) network
b) Ethernet network
c) Token Ring network
d) Both b) and c)

Question No. 6

What is an example of a connection-oriented network?
a) Ethernet network
b) Token Ring network
c) ATM (Asynchronous Transfer Mode) network
d) FDDI (Fiber Distributed Data Interface) network

Question No. 7

What are the two main metrics used to measure network performance?

a) Delay and throughput
b) Bandwidth and delay
c) Speed and reliability
d) Accuracy and efficiency

Question No. 8

What is the most common cause of network performance degradation?
a) Network congestion
b) Network security monitoring
c) Network hardware modification
d) Packet fragmentation

Question No. 9

What is a common protocol used for internetworking between different types of computer networks?
a) TCP/IP (Transmission Control Protocol/Internet Protocol)
b) IPX/SPX (Internetwork Packet Exchange/Sequenced Packet Exchange)
c) NetBIOS (Network Basic Input/Output System)
d) AppleTalk

Question No. 10

What is a Router in computer networks?
a) A device that connects multiple independent computer networks together to form a larger network
b) A device that connects a single computer to the internet
c) A device that connects a single network to multiple remote networks
d) A device that connects a single computer to a local network

Question No. 11

What is TCP/IP in computer networks?
a) A set of communication protocols used to transmit data over a network
b) A type of computer hardware used to connect to a network
c) A software application used to manage network connections
d) A security protocol used to protect data transmitted over a network

Question No. 12

How many layers are there in the TCP/IP model?
a) 5
b) 7
c) 3
d) 6

Question No. 13

What is the name of the layer in the TCP/IP model responsible for routing and forwarding of data packets?

a) Application Layer
b) Transport Layer
c) Network Layer
d) Physical Layer

Question No. 14

What is the name of the layer in the TCP/IP model responsible for supporting application-level services such as **email, file transfer, and web browsing?**

a) Application Layer
b) Transport Layer
c) Network Layer
d) Physical Layer

Explanation:
The Application Layer in the TCP/IP model is responsible for providing services like email (SMTP), file transfer (FTP), and web browsing (HTTP/HTTPS). It interacts directly with user applications.

// **SMTP** stands for Simple Mail Transfer Protocol.
It is used to send emails from a client to a server or between email servers.

Question No. 15

What is an IP address in computer networking?

a) A unique identifier assigned to a computer or device on a network
b) A type of computer hardware used to connect to a network
c) A software application used to manage network connections
d) A security protocol used to protect data transmitted over a network

Question No. 16

What are the two versions of IP addresses used in computer networking?
a) IPv4 and IPv5
b) IPv4 and IPv6
c) IPv3 and IPv4
d) IPv5 and IPv6

Question No. 17

What is the maximum number of bits in an IPv4 address?
a) 32 bits
b) 64 bits
c) 128 bits
d) 256 bits

Question No. 18

What is the maximum number of bits in an IPv6 address?
a) 32 bits
b) 64 bits
c) 128 bits
d) 256 bits

Question No. 19

What is the default subnet mask for Class A IP addresses?
a) 255.0.0.0
b) 255.255.0.0
c) 255.255.255.0
d) 255.255.255.255

Question No. 20

What is the default subnet mask for Class B IP addresses in the Classful addressing scheme?
a) 255.0.0.0
b) 255.255.0.0
c) 255.255.255.0
d) 255.255.255.255

Question No. 21

What is the default subnet mask for Class C IP addresses in the Classful addressing scheme?
a) 255.0.0.0 (Class A)
b) 255.255.0.0 (Class B)
c) 255.255.255.0
d) 255.255.255.255

Subnet mask defines how much of the IP address is the network part and how much is host part.

Question No. 22

What is the primary benefit of using subnet masks in computer networking?
a) Improved network security
b) Increased network speed
c) Better network organization and scalability
d) Enhanced network compatibility

Question No. 23

What is subnetting in computer networking?
a) A method of dividing a large network into smaller sub-networks
b) A technique for increasing network speed
c) A method of enhancing network security
d) A process of improving network compatibility

Used to improve routing **efficiency**, **control traffic**, and **reduce congestion.**

Question No. 24

What is the main reason for subnetting a network?
a) To improve network security
b) To increase the number of available IP addresses
c) To reduce network congestion
d) To enhance network compatibility

Subnetting **divides a large network into smaller subnetworks** (subnets). This reduces congestion by limiting broadcast traffic to each subnet, improving overall network performance and management.

Question No. 25

What is CIDR notation in computer networking?
a) A method of subnetting a network
b) A technique for expressing IP addresses and subnet masks in a compact form
c) A method of improving network security
d) A process of enhancing network compatibility

Question No. 26

How does CIDR notation differ from traditional IP address notation?

a) CIDR notation uses a slash (/) to separate the IP address and the subnet mask
b) CIDR notation uses only binary digits to express IP addresses and subnet masks
c) CIDR notation uses hexadecimal digits to express IP addresses and subnet masks
d) CIDR notation uses decimal digits to express IP addresses and subnet masks

Explanation:
CIDR (**Classless Inter-Domain Routing**) notation expresses an IP address followed by a slash and the number of bits in the subnet mask (e.g., 192.168.1.0/24).

Question No. 27

What is the purpose of Address Resolution Protocol (ARP)?
a) To convert IP addresses into physical addresses
b) To translate domain names into IP addresses
c) To forward data between networks

d) To encrypt network data for security

Question No. 28

What type of information is stored in an ARP cache?
a) A mapping of IP addresses to physical addresses
b) A list of active network devices
c) A list of network routes
d) Information about network congestion

ARP cache stores the correspondence between IP addresses and their associated MAC (physical) addresses on a local network.

Question No. 29

What are the two main components of an IP datagram?
a) Data and header
b) Payload and checksum
c) Source IP address and destination IP address
d) Sequence number and acknowledgment number

Explanation:
An IP datagram consists of a **header** (which contains control information like source and destination addresses) **and** the **data** (also called ***payload***) which is the actual information being sent.

Question No. 30

What is the purpose of the source IP address field in the header of an IP datagram?

a) To identify the source of the datagram
b) To identify the destination of the datagram
c) To determine the routing path for the datagram
d) To calculate the checksum for the datagram

Question No. 31

What is the purpose of fragmentation in networking?
a) To break up large data packets into smaller fragments for transmission over the network
b) To merge multiple data packets into a larger packet for transmission over the network
c) To encrypt data packets for secure transmission over the network
d) To compress data packets for efficient transmission over the network

Question No. 32

What happens to a fragmented IP datagram when it reaches its destination?
a) The fragments are reassembled into the original datagram
b) The fragments are discarded and the original datagram is lost
c) The fragments are combined with other fragments to create a new datagram
d) The fragments are transmitted as separate datagrams

Question No. 33

What is the main reason for the creation of IPv6?
a) To increase the number of available IP addresses
b) To improve network security
c) To enhance network performance
d) To support newer networking technologies

Question No. 34

What is the format of an IPv6 address?
a) 32-bit decimal number (format of an IPv4 address…)
b) 32-bit hexadecimal number
c) 128-bit hexadecimal number
d) 128-bit decimal number

Question No. 35

What does ICMP stand for?
a) Internet Control Message Protocol
b) Internet Connection Message Protocol
c) Internet Communication Message Protocol
d) Internet Control Message Procedure

Question No. 36

What is the main function of ICMP in networking?
a) To provide error and control messages
b) To provide data transfer services
c) To provide routing services
d) To provide security services

Question No. 37

What does UDP stand for?
a) User Datagram Protocol
b) Universal Datagram Protocol
c) Unified Datagram Protocol
d) Universal Data Protocol

Question No. 38

What does NAT stand for?
a) Network Address Translation
b) Network Address Transfer
c) Network Automatic Translation
d) Network Automatic Transfer

NAT (Network Address Translation) is a method used in networking to map **private IP addresses to a public IP address** **before transferring the information onto the internet**, *allowing multiple devices on a local network to share a single public IP*.

Question No. 39

Following is a a multicast routing scheme in which the protocol software builds a delivery tree from a central point.

(a) Core Based Trees (CBT)
(b) Core Based Seeds (CBS)
(c) Core Based Roots (CBR)
(d) Core Oriented Trees (COT)

Explanation:
Core Based Trees (CBT) is a multicast routing protocol where a **shared tree** is constructed from a **central point** (core router) to all multicast group members. This *improves scalability and reduces overhead* compared to source-based trees.

Question No. 40

In Client-Server Paradigm the **passive program** is called a _____ and the **active program** is called a _____.

(a) Server, Client
(b) Client, Domain
(c) Domain, Server
(d) Server, DNS

Explanation:
- In the Client-Server Paradigm:
    - The server is the passive program (it waits for requests).
    - The client is the active program (it initiates the connection).

3 marks

Question No. 41

Network administrator wants to assign three IP addresses on different hosts in a network; each address starts with 11 bit. Write the class to which these IP addresses belong.

Solution:

Class C

Explanation of Classes by First Bits:

- Class A → Starts with 0 → Range: 0.0.0.0 – 127.255.255.255
- Class B → Starts with 10 → Range: 128.0.0.0 – 191.255.255.255
- Class C → Starts with 110 → Range: 192.0.0.0 – 223.255.255.255
- Class D (Multicast) → Starts with 1110
- Class E (Experimental) → Starts with 1111

So, *first 2 bits 11* indicates the IP belongs to Class C or higher, but specifically:

- If *first 3 bits are 110*, it's Class C.

Question No. 42

Write the subnet mask of address 130.4.102.1/19.

Solution:

255.255.224.0

How?

First 8 bits: `255`

Second 8 bits: `255`

Third 8 bits: First 3 bits set to 1 (since 19 − 16 = 3 bits in the third octet), remaining 5 bits are 0.

Question No. 43

Consider the IP address 198.2.1.0/28 with subnet mask 255.255.255.240. You are required to write the total number of subnets.

Solution:

198.2.1.0 is a Class C (default /24). Mask /28 = 255.255.255.240.

Subnetting bits = 28 − 24 = 4 bits.

Total number of subnets = 24=162^{4} = 16.

(For extra context: each /28 subnet has 4 host bits → 24=162^4=16 addresses, 14 usable hosts per subnet.)

Question No. 44

Mention name of the technique in the context of address resolution which is used for transformation of a string of characters into shorter fixed-length value or a key that represents the original string?

Solution:

That technique is called Hashing.

Question No. 45

Is there any advantage of upgrading from IPV4 to IPV6? Justify with just one reason.

Solution:

Yes ✓ — **IPv6 provides a vastly larger address space** (128-bit vs IPv4's 32-bit)

Question No. 46

What is an Autonomous System? Give one example.

Solution:

An **Autonomous System (AS)** is a collection of IP networks and routers under the control of a single organization that follows a unified routing policy.

Example:

AS15169 → belongs to Google.

AS7018 → belongs to AT&T.

5 marks

Question No. 47

Consider the IP address: 168.50.12.4 and its corresponding subnet mask 255.255.192.0, find out the following:

a. The number of bits used for subnetting
b. Total number of useable hosts in the subnet
c. Write the CIDR notation for the above scenario

Solution:

Mask 255.255.192.0 in binary = 11111111.11111111.11000000.00000000 → that's **18 ones** total (i.e. **/18**).

a. **Bits used for subnetting:**

If you assume classful boundaries: 168.x.x.x is Class B (default /16). Mask is /18, so subnetting bits = **18 − 16 = 2 bits**.

b. **Total number of usable hosts per subnet:**

Host bits = 32 − 18 = 14.

Total addresses = 214=163842^{14} = 16384214=16384.

Usable hosts = 16384 − 2 (network + broadcast) = **16,382 hosts**.

c. **CIDR notation:**

168.50.12.4/18 (network portion length = 18 bits).

Question No. 48

As the internet users have increased, already existed IPV4 addresses were exhausted. So, to overcome this problem; IPv6 addresses were introduced. In the context of IPV6, you are required to answer the following:

1. What is the address size of IPV6 address?
2. Which field is used to identify a specific path through a network?
3. Which feature allows audio and video applications to establish appropriate connections?

Solution:

1. Address size of IPv6 address:

- **128 bits** (written as eight groups of 16-bit hexadecimal blocks).

2. Field used to identify a specific path through a network:

- **Flow Label** field.

3. Feature that allows audio and video applications to establish appropriate connections:

- **Flow Control & Quality of Service (QoS)** via the **Traffic Class** and **Flow Label** fields, which help prioritize real-time traffic like audio/video.

Question No. 48

Differentiate between EGP and IGP with at least two differences.

Solution:

Aspect	EGP (Exterior Gateway Protocol)	IGP (Interior Gateway Protocol)
Scope	Used for routing **between** different Autonomous Systems (inter-domain routing).	Used for routing **within** a single Autonomous System (intra-domain routing).
Examples	BGP (Border Gateway Protocol) is the main EGP.	RIP, OSPF, EIGRP, IS-IS are common IGPs.
Routing Focus	Policy-based routing, scalability, and control between organizations.	Fast convergence, efficiency, and optimal routing within one organization.

Question No. 50

Write any five characteristics of Border Gateway Protocol.

Solution:

five characteristics of Border Gateway Protocol (BGP):

1. **Path Vector Protocol** – Uses the AS-path attribute to avoid routing loops.
2. **Policy-Based Routing** – Decisions are made according to administrator-defined policies, not just shortest path.
3. **Highly Scalable** – Handles very large routing tables, suitable for Internet-scale networks.
4. **Runs over TCP** – Uses TCP port **179** for reliable session management between peers.
5. **Supports CIDR** – Allows classless routing and efficient IP address allocation.

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