Name: _____   Roll No: _____

Computer Networks – Objective Solutions

Define Modulation and Encoding? What is the difference between the two?

Modulation is converting incoming signal (analog, digital) to an analog output. Encoding is converting incoming signal (analog, digital) to a digital output.

Define Data Rate and Baud Rate? What is the difference between the two?

Bits per second, signal elements per second. 1 bit may or may not correspond to one signal.

The maximum data rate of a channel depends on three factors, what are these?

Bandwidth available, number/level of signals in use, level of noise

List down three main differences between DNS and ARP

- English name <-> IP, IP <-> MAC
- Independent servers, software module
- For entire internet, for current subnet
- Has to be configured, plug n play

List down three main differences between IP address and MAC address

- Fixed, reconfigurable
- Flat, hierarchical
- 4B, 6B
- Layer 3, layer 2

What is the main feature that makes switch an 'intelligent' hub. Explain

- Store and forward

It is said that layer 2 switch works in a 'transparent' manner. Explain

- Packets are not addressed to a switch

Out of the 5 layers of TCP/IP model, which layers are made in software and which layers are made in hardware?

Layer 1 and 2 in hardware

Name two protocols that do not fall into the traditional 5 layers of TCP/IP model i.e., they cross two layers. Also list which layers they cross? And what is their basic functionality.

- ICMP 3.5 (layer 3 and 4)
- ARP 2.5 (layer 2 and 3)

What is the "core" responsibility of Transport Layer? What is the "core" responsibility of Network Layer?

Multiplexing/Demultiplexing, Forwarding and Routing

What is the main difference between "Forwarding" and "Routing"?

Routing, intelligent path calculation, Forwarding: following the already calculated paths

What is the best case and the worst case network efficiency for Bit-Map protocol? Explain all the terms involved in any formula

d/(N+d) --- d/(N+1)

Channel efficiency of Ethernet is given as $\dfrac{1}{1+2\,BLe/cF}$. Explain the consequences of increasing network bandwidth (B), assuming everything else remains constant.

Efficiency decreases

Fill in the table by providing "Yes" or "No"

	ALOHA	Non Persistent	CSMA/CD
Slotted Time	N	N	N/Y
Reservation Based	N	N	N
Carrier Sense	N	Y	Y
Aborts on Collision	N	N	Y

What is the main trade off between CSMA protocols and Reservation based protocols?

Avoid collision by inserting extra bits (used for reservation).

It is said that 1-persistent CSMA is 'greedy'. Do you agree? Explain your answer

Yes. Transmits as soon as the channel gets free

Consider the discussion on IPv4 to IPv6 transition. What is the main benefit of "tunneling" as compared to the "dual stack approach"? Explain tunneling briefly.

Data loss (flow id) can be avoided. Put entire IPv4 datagram in the data field of IPv6.

Explain the two major reasons because of which Internet is not a single network but a series of connected Autonomous Systems.

Scale, policy

Explain TCP Fast Retransmit policy.

Retransmit on 3 duplicate ACKs

Explain the functionality of "Receive Window" field in the TCP Header.

Used by receiver to inform how much data it can receive, flow control.

Both iBGP and OSPF protocols run inside an Autonomous System. What is the specific purpose of each? In which order should they run? Does the order matter?

How to reach other AS vs how to reach different nodes in the same AS. OSPF first.

Following Two Questions relate to the ACM Webinar on Future of the Internet

What is meant by Digital Vellum? Why is it a huge challenge?

Digital Vellum is a regime in which information can be preserved and will be preserved for 100s and 1000s of years.

Every day we use complex software in order to produce complex digital objects stored in files. Those files are literally useless to us unless the software that created them is available in order to look at them or interact with them. We have a problem preserving that capability over 100s of years because it isnt clear that software written for the purpose of creating content will survive over 100s of years. We have to figure out how to resolve the problem making your content accessible and useful over long periods of time. Technically, how do I make sure that I can still run old software or interpret old files, and how do I deal with the possibility that companies may go out of business and their IP (including their software) may or may not be available in order to fulfill the objective.

What are Delay and Disruption tolerant Networking protocols? How are they different from TCP? Where are they used?

Delay and disruption tolerant networking protocols are an alternate to TCP protocols and are useful for man and robotic interstellar explorations. They are capable of (1) dealing with long and variable delays and (2) storing data in the network until it can be forwarded, both features are not supported by TCP, in order to deal with the episodic disruption as a result of planetary motion or planetary rotation.

Following Two questions relate to the Seminar on Server Virtualization and Consolidation

What is meant by Server Consolidation? Give two advantages of server consolidation.

Instead of having 1 server on 1 physical machine, have several (virtual) servers on 1 physical machine. Cost, Space, Energy, Management etc

What is a Hypervisor? What percentage of resources does it consume?

Hypervisor is a light weight OS, allows virtual machine hosting. Uses 10% of resources on average.