Computer Networks

BCST -502 BCSP- 502

B.Tech (CSE) 5th Semester

Course Instructor: Dr Bishwajeet Pandey

New 2020 Syllabus

Unit –I

Computer Network: Definitions, goals, components, Architecture, Classifications & Types.Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, ConnectionOriented & Connectionless Services, Service primitives, Design issues & its functionality. ISOOSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Principals of physical layer: Media, Bandwidth, Data rate and Modulations

Unit-II

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary &Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Protocol verification: Finite State Machine Models & Petri net models. ARP/RARP/GARP

Unit-III

MAC Sub layer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), CollisionFree Protocols: Basic Bit Map, BRAP, Binary Count Down, MLMA Limited Contention Protocols: Adaptive Tree Walk, Performance Measuring Metrics. IEEE Standards 802 series & their variant.

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Unit-IV

Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least CostRouting algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing,Broadcast Routing, Multicast Routing. IP Addresses, Header format, Packet forwarding,Fragmentation and reassembly, ICMP, Comparative study of IPv4 & IPv6

Unit-V

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, CarryingUnicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of DataTransfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP TimerManagement. Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP).

About Course Instructor

- PhD from Gran Sasso Science Institute, Italy
- PhD Supervisor Prof Paolo Prinetto from Politecnico Di Torino, World Rank 13 in Electrical Engineering
- MTech from Indian Institute of Information Technology, Gwalior
- Scopus Profile: https://www.scopus.com/authid/detail.uri?authorId=57203239026
- Google Scholar: https://scholar.google.com/citations?user=UZ_8yAMAAAAJ&hl=hi
- Contact: gyancity@gyancity.com, +91-7428640820 (For help in this Subject @ BIAS and Guidance for future MS from Europe and USA after BIAS)

About Course Outline

- UNIT 1: Lecture No 1-4
- UNIT 2: Lecture No 5-8
- UNIT 3: Lecture No 9-13
- UNIT 4: Lecture No 14-10
- UNIT 5: Lecture No 20-25
- Lecture No 26-35 to Discuss Question Paper of Previous 5 Years
- Out of 35 Lectures: 10 will delivered by Professor From Foreign University

Lecture 1: Computer Network

Lecture 2: Network Architecture

Lecture 3: TCP/IP and OSI Model

Lecture 4: Principles of Physical Layer

Lecture 3: TCP/IP and OSI Model

Course Instructor: Dr. Bishwajeet Pandey

OSI Model	TCP/IP Model
	
It stands for Open Systems Interconnection.	It stands for Transmission Control and Internet Protocol.

TCP/IP and OSI Model

TCP/IP MODEL
Application Layer
Transport Layer
Internet Layer
Network Access Layer

OSI MODEL
Application Layer
Presentation Layer
Session Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

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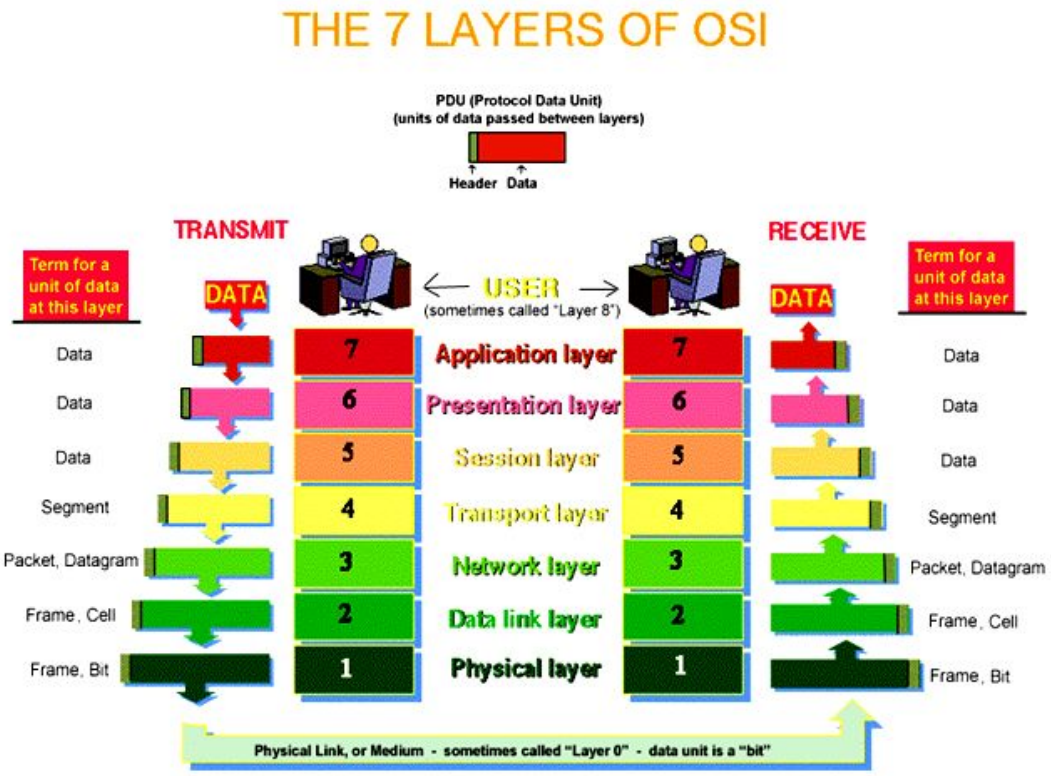
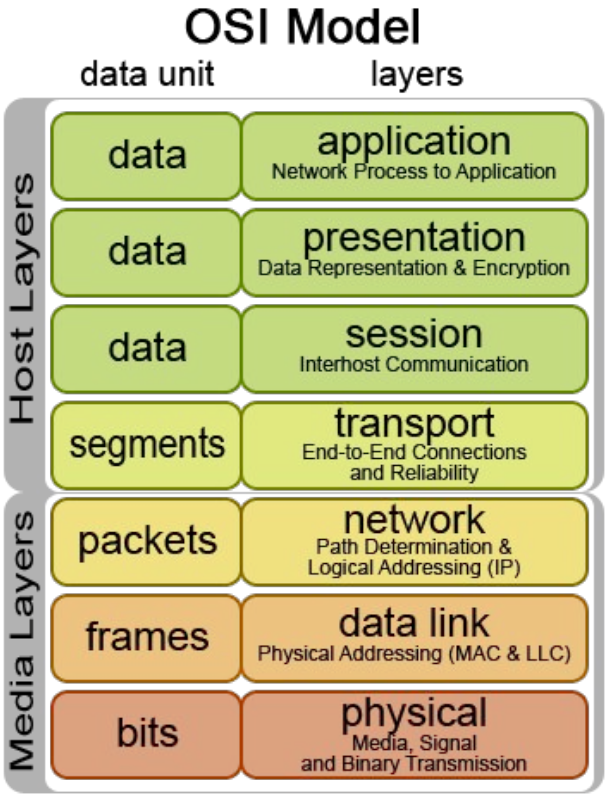
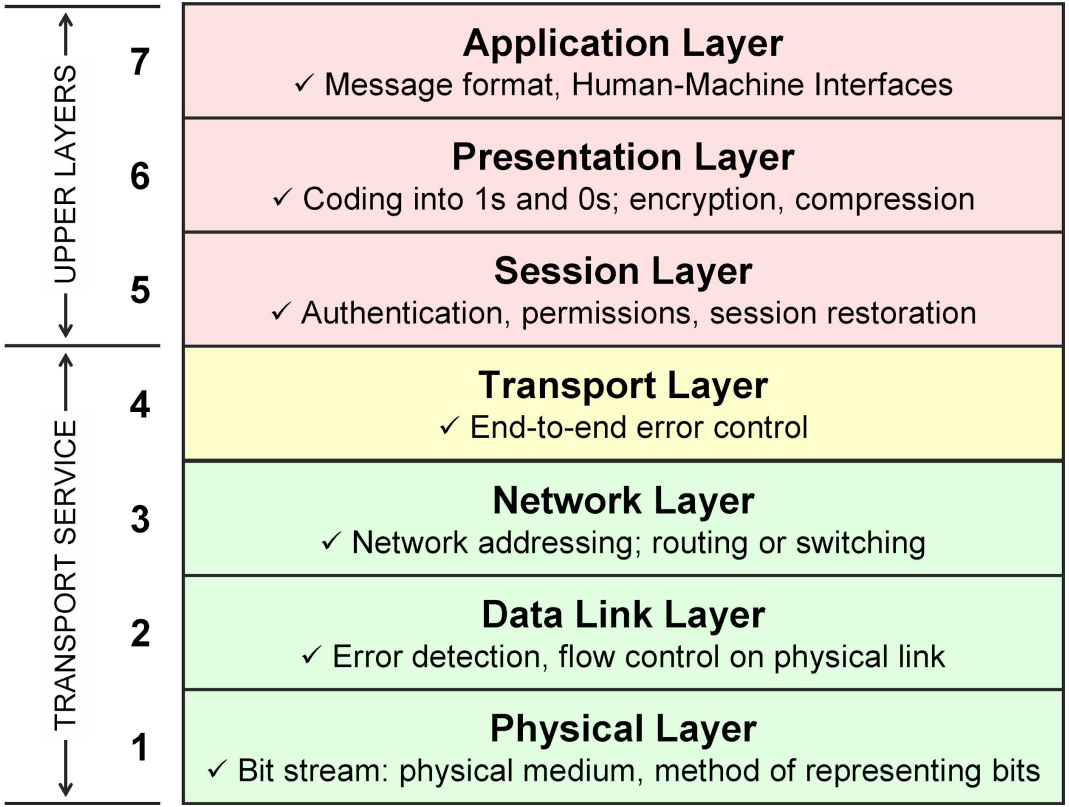
The 7 Layers of OSI



Media Layers and Host Layers: Data Units



Functions of OSI Layers



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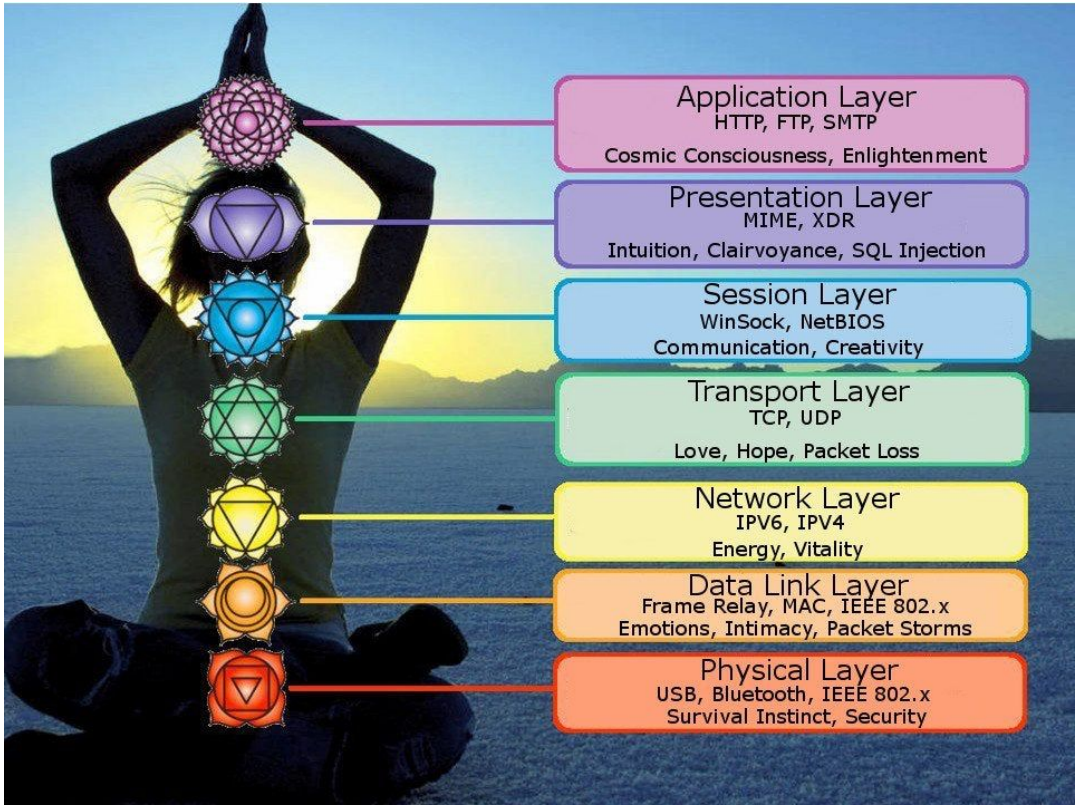
OSI Model: Programmer Humors



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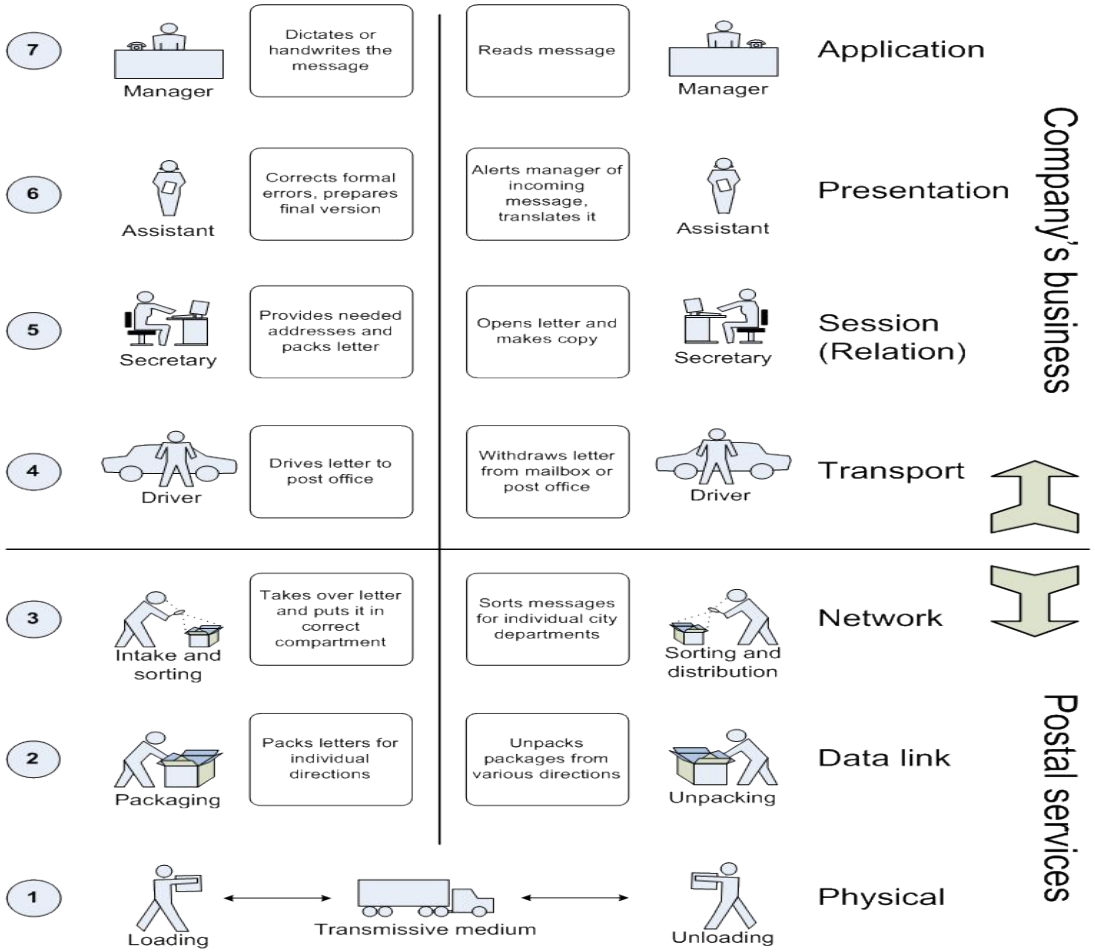
OSI Model: Programmer Humors

1	Physical	IEEE 1394, 100BASE-TX, ISDN
2	Data Link	802.11, Ethernet, L2CAP, LLDP
3	Network	IP, ICMP, IGMP, IPX
4	Transport	TCP, UDP, ATP
5	Session	PPTP, SOCKS, NetBIOS
6	Presentation	ROSE, RTSE, CMIP
7	Application	HTTP, LDAP, NFS, SMB
8	Human	Coffee, Pizza, Study, Friendship.....



RM – OSI and letter communication parallel

Layer 1: Physical

- The first layer is literally the physical connection between two or more systems.
- It may be a cable, an RF transmission, or even air currents and Carrier pigeons in one particular instance (RFC 1149).

Layer 2: Data Link

- The second layer is concerned with the way that data is transmitted over a physical layer.
- It only deals with how units of data are put together for transmission, and nothing else.
- Two common example of this are Ethernet and WiFi, each of which specifies how to signal the duration of a transmission, the spacing between transmissions, etc, but neither of which species anything about the content of those transmissions.

Layer 3: Network

- The third layer takes care of addressing and grouping senders and receivers.
- The Data Link layer doesn’t care if you are talking to a system eight inches of wire away or around the world.
- The Network layer only deals with how to identify who is sending data, who should receive it, and how each can communicate logically.

Layer 4: Transport

- The fourth layer is only concerned with whether or not data gets to its destination.
- In the case of Transmission Control Protocol (TCP) it makes certain that delivery occurs.
- In the case of User Datagram Protocol (UDP) it makes certain that data is sent out, but that's it.
- In short, it acts like Indian Post, DHS, FedEx, or your cousin Ryker. Some of those may be reliable, some may cost more, and some may or may not even get to where they were going.

Layer 5: Session

- The fifth layer deals with which strand of communication we are talking about.
- Think of this like email threads or conversations.
- Your email system as a whole delivers messages to you, and some are part of threads/conversations, while others are completely standalone.
- In reality, it's more about multiple connections, but the email idea is what I've found is generally best to describe this.

Layer 6: Presentation

- The sixth layer deals with conversion of data from one format to another.
- Note that this is not application-specific data (e.g. PDF being opened by Word) but rather data format information (e.g. converting from one character format to another, such as is done by Telnet).

Layer 7: Application

- The seventh layer (which is the last one officially defined) deals with “everything else” and is the layer that humans interact with.

Difference between TCP/IP and OSI Model:

TCP/IP	OSI
TCP refers to Transmission Control Protocol.	OSI refers to Open Systems Interconnection.
TCP/IP has 5 layers.	OSI has 7 layers.
TCP/IP is more reliable	OSI is less reliable
TCP/IP does not have very strict boundaries.	OSI has strict boundaries
TCP/IP follow a horizontal approach.	OSI follows a vertical approach.
TCP/IP uses both session and presentation layer in the application layer itself.	OSI uses different session and presentation layers.
TCP/IP developed protocols then model.	OSI developed model then protocol.

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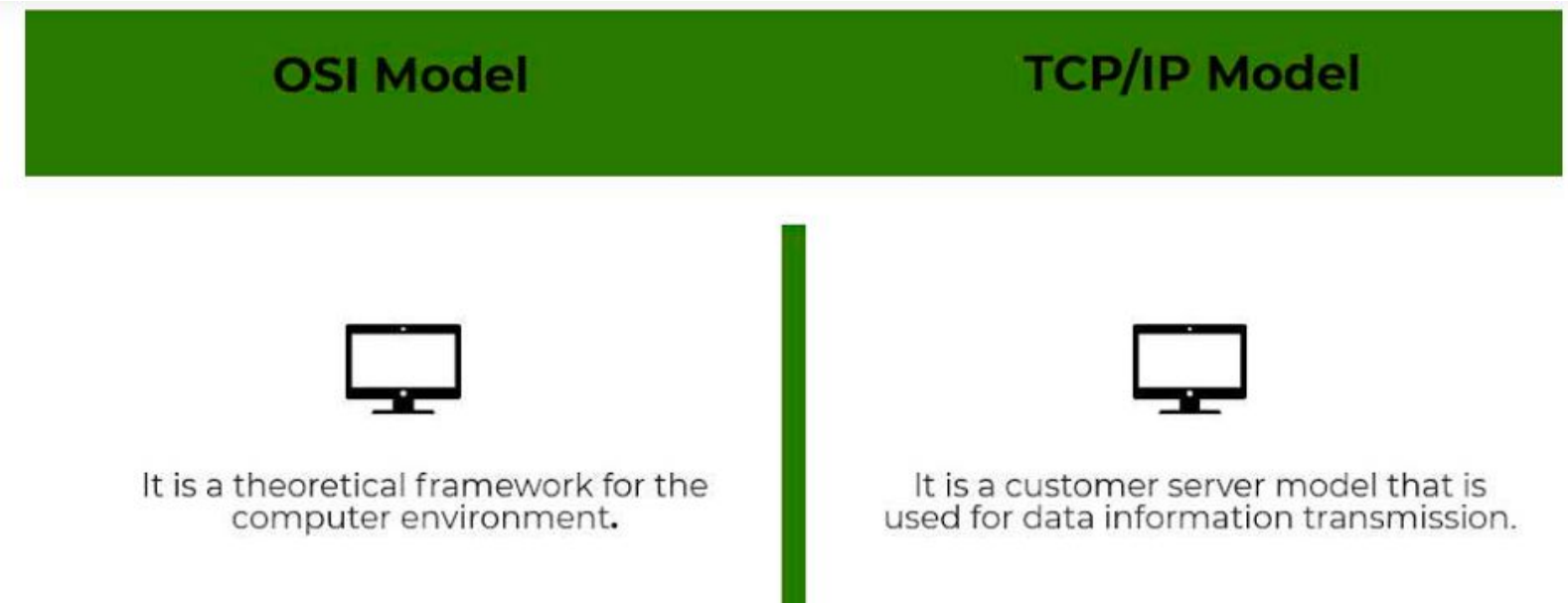
Difference between TCP/IP and OSI Model:



GATE Question 1

1) The protocol data unit(PDU) for the application layer in the Internet stack is

(A) Segment

(B) Datagram

(C) Message

(D) Frame

The Protocol Data Unit for Application layer in the Internet Stack (or TCP/IP) is called Message.

GATE Question 2

2) Which of the following transport layer protocols is used to support electronic mail?

(A) SMTP

(B) IP

(C) TCP

(D) UDP

E-mail uses SMTP as application layer protocol. SMTP uses TCP as transport layer protocol.

GATE Question 3

Which one of the following is not a client server application?

(A) Internet chat

(B) Web browsing

(C) E-mail

(D) ping

Answer: (D)

Explanation: Ping is not a client server application. Ping is a computer network administration utility used to test the reachability of a host on an Internet Protocol (IP). In ping, there is no server that provides a service.

GATE Question 4

4) Match the following:

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(P) SMTP      (1) Application layer

(Q) BGP       (2) Transport layer

(R) TCP       (3) Data link layer

(S) PPP       (4) Network layer

              (5) Physical layer
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(A) P – 2 Q – 1 R – 3 S – 5

(B) P – 1 Q – 4 R – 2 S – 3

(C) P – 1 Q – 4 R – 2 S – 5

(D) P – 2 Q – 4 R – 1 S – 3

GATE Question 5

In the following pairs of OSI protocol layer/sub-layer and its functionality, the INCORRECT pair is

(A) Network layer and Routing

(B) Data Link Layer and Bit synchronization

(C) Transport layer and End-to-end process communication

(D) Medium Access Control sub-layer and Channel sharing

Answer: (B)

GATE Question 6

Which of the following is NOT true with respect to a transparent bridge and a router?

(A) Both bridge and router selectively forward data packets

(B) A bridge uses IP addresses while a router uses MAC addresses

(C) A bridge builds up its routing table by inspecting incoming packets

(D) A router can connect between a LAN and a WAN

Answer: (B)

GATE Question 7

Which one of the following statements is FALSE?

(A) HTTP runs over TCP

(B) HTTP describes the structure of web pages

(C) HTTP allows information to be stored in a URL

(D) HTTP can be used to test the validity of a hypertext link

Answer: (B)

Explanation: HTML describes structure of page not HTTP.

20 August Thursday Lecture by Vikas Jha

Vikas Jha is a Consultant Network Professional. He has 7+ Years of Network Solutions experience (Including BT and Tata Communications Limited formerly VSNL)

Education:

Mtech (CSE): ABV-IIITM Gwalior

B.E.(E&C): RGPV Bhopal