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Data Communications & Computer Networks

REVISED SYLLABUS OF
B.Sc. (INTERNET OF THINGS)
UNDER CBCS FRAMEWORK
WITH EFFECT FROM 2020-21

Cheekatimarla Anil Kumar

Data Communications & Computer Networks

B .Sc (M.E.IOT) II year III Semester

REVISED SYLLABUS OF B.Sc. (INTERNET OF THINGS) UNDER
CBCS FRAMEWORK WITH EFFECT FROM 2020-2021

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Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may creep in. any mistake, error or discrepancy noted may be brought to our notice, which shall be taken care of in the next edition.

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PREFACE

It is indeed a great pleasure and privilege to present "Data Communications & Computer Networks" that not only caters to the Second year - third semester B.Sc (Internet of Things) course, but also quite beneficial for the beginners of this field. The primary aim of the authors has been to present the material in a comprehensive manner so as to help the students to easily grasp the subject and reproduce it whenever and wherever required. While writing the book, it was kept in mind to include only the relevant topics so that it is useful both for learning and reference purpose. This book comes into existence due to my observation of lack of support material of undergraduate students.

Cheekatimarla Anil Kumar

ABOUT THE AUTHOR



Cheekatimarla Anil Kumar is working as Lecturer in Computer Science at V.S.R. Govt. Degree & P.G. College, Movva, Krishna district since July, 2009. He is an President for Sree Vijayananda Degree College, Pedana, Krishna District. He holds an M.Sc in Computer Science from Acharya Nagarjuna University, Guntur, and P.G.D.C.A from Indian Institute of Computer Management, Hyderabad.

A prolific writer, he has authored a large number of research papers and several books in Computer science with ISBN/ISSN numbers, they are:

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- Published research paper on "Design based pre-distribution schemes for wireless sensor networks using scalable key" by International Journal of Computer Science and technology with ISSN no: 0976-8491
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- Published a research paper on "Emerging topics in Information and Communication technology" at UGC sponsored National seminar organized by Govt. Degree College, Guntur with ISBN no: 978-93-85132-12-4
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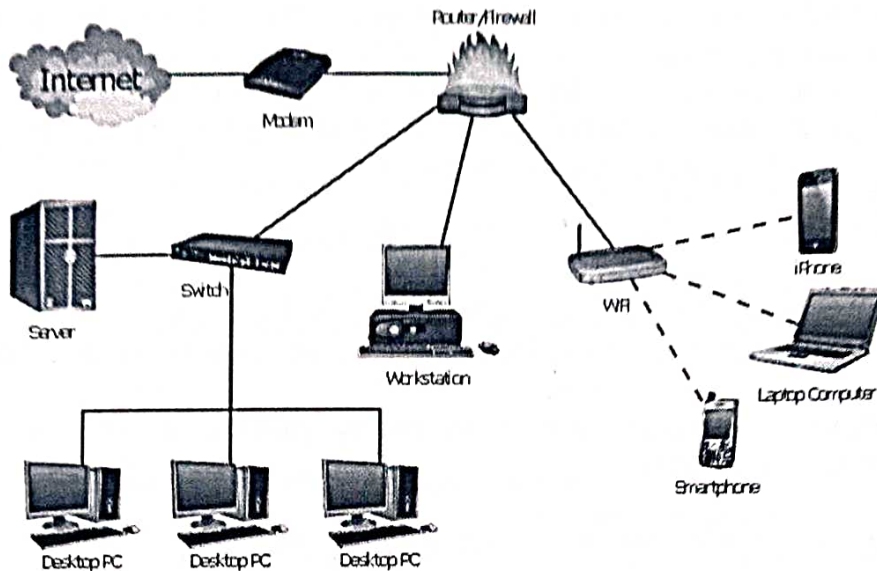
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Chapter – 1: Introduction to Data Communications

1.1. What is a Network?

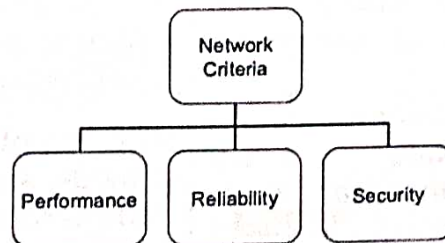
A "network" is a set of devices connected by a media links. A "node" can be a Computer, Printer, or any other device capable of sending and / or receiving data generated by other nodes on the network. The links connecting the devices are often called communication channels.



- Networks use "distributed processing", in which a task is divided among multiple computers.
- Instead of a single large machine being responsible for all aspects of a process, each separate computer (usually a personal computer or workstation) handles a subset.
- Networks follow protocols, which define how communications are sent and received.

1.2. Network Criteria:

A network must be able to meet certain number of criteria, because it helps to improve network functionality. The most important are Performance, Reliability and Security.

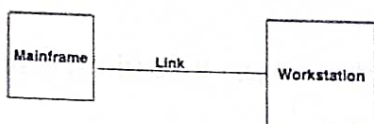
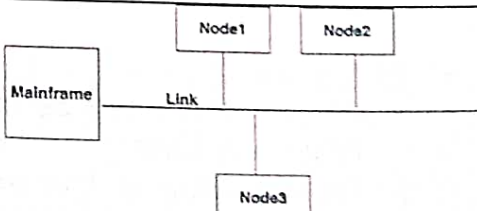


- Performance:
 - Performance can be measured in many ways, including transit time and response time.
 - Transit time is the amount of time required for a message to travel from one device to another.

Data Communications & Computer Networks

- Response time is the elapsed time between an inquiry and a response.
- The performance of a network depends on a number of factors, including:
 - The number of users
 - The type of transmission medium
 - Connected hardware
 - Software
- **Reliability:**
 - In addition to accuracy of delivery, Network reliability is measured by frequency of failure, the time it takes a link to recover from a failure, and the network's robustness in a catastrophe.
 - "Catastrophe" - Network must be protected from catastrophic events such as fire, earthquake, or theft.
- **Security:**
 - Network security issues include protecting data from unauthorized access and viruses.
 - Protection can be accomplished at a number of levels. At the lowest level are user identification codes and password. At a higher level are encryption techniques.
 - Network is accessible from many points, it can be susceptible to computer viruses.

1.3. Point to Point and multipoint connection:

Point to point communication	Multipoint Communication
Point to point communication means the channel is shared between two devices.	Multipoint Communication means the channel is shared among multiple devices or nodes.
In this communication, There is dedicated link between two nodes.	In this communication, link is provided at all times for sharing the connection among nodes.
In this communication, the entire capacity is reserved between these connected two devices with the possibility of waste of network bandwidth / resources.	In this communication, the entire capacity isn't reserved by any two nodes and the network bandwidth is maximum utilized.
In this communication, there is one transmitter and one receiver.	In this communication, there is one transmitter and many receivers.
In point-to-point connections, the smallest distance is most important to reach the receiver.	In Multi-point connections, the smallest distance is not important to reach the receiver.
Point-to-point communication provides security and privacy because communication channel is not shared.	Multi-point communication does not provide security and privacy because communication channel is shared.
	

1.4. Topology:

The network topology is a structure or the physical arrangement of the network devices, how the components of the network are interconnected with each other.

Types of network topology are as follows

- Bus
- Star
- Ring
- Mesh
- Hybrid
- Tree

Physical Topology

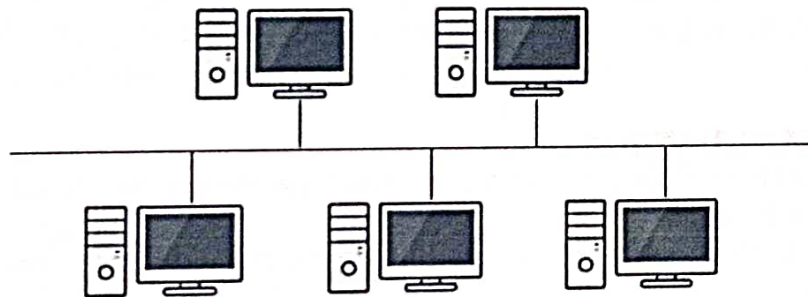
A Physical topology explains about how network devices are physically connected or how devices are actually plugged into each other, for example cables, wireless connectivity and more.

It is a diagram which shows the structure of how devices are connected physically inside a network. It refers to how a network looks and functions.

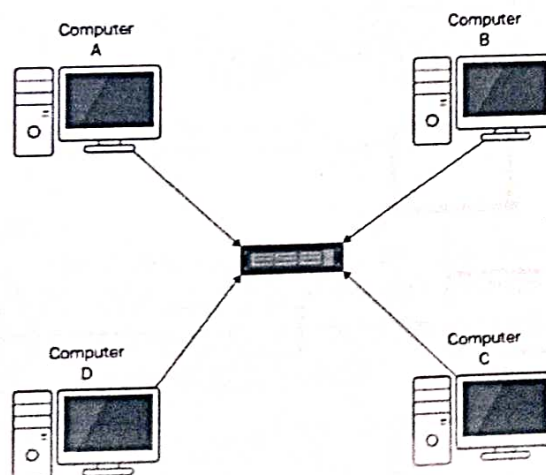
Types

The types of physical topology are as follows –

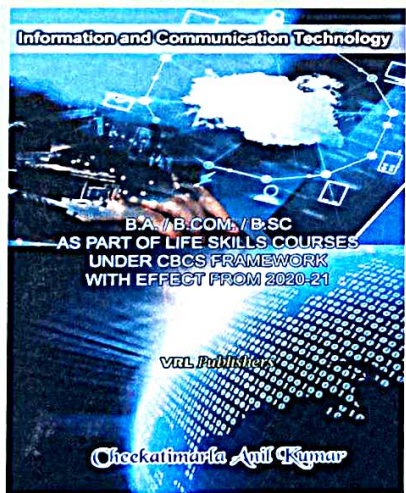
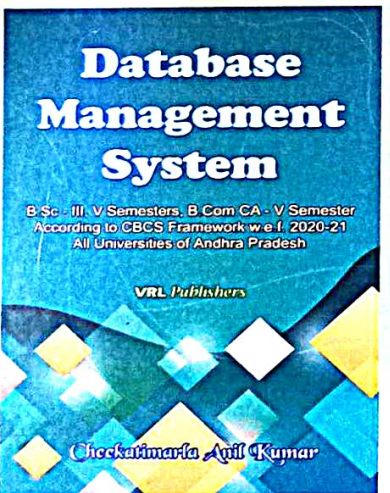
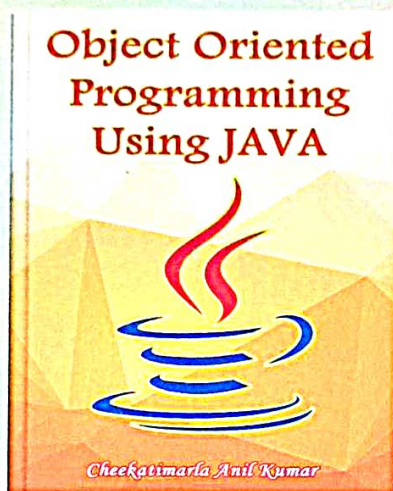
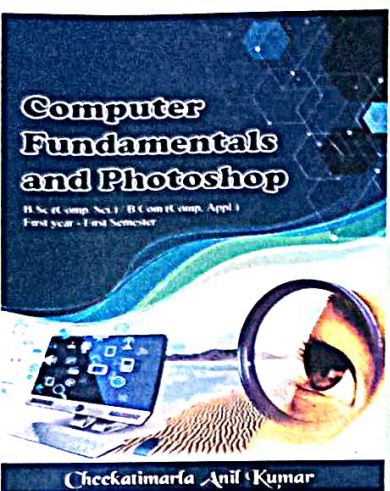
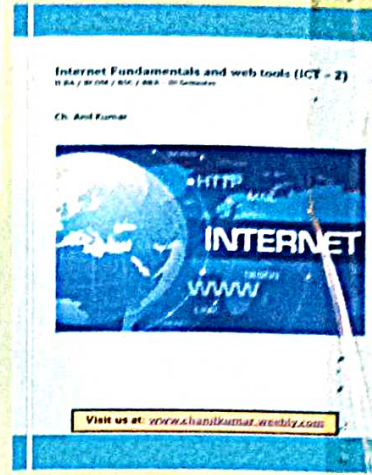
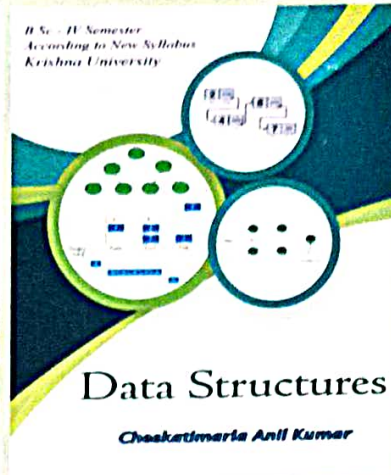
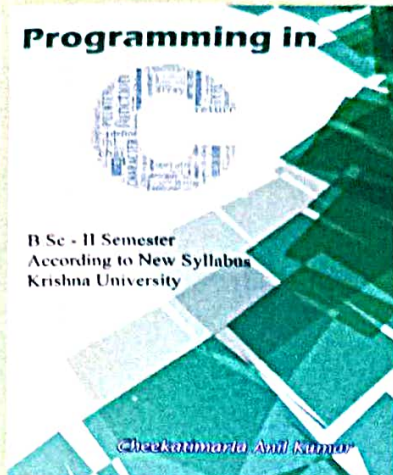
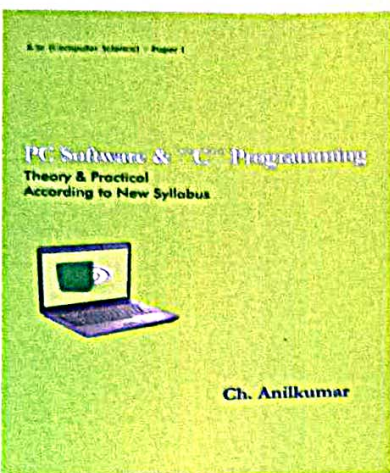
- Linear Bus topology – A single wire cable that connects to all network nodes directly.



- Star topology – It is a single access point topology; it means all nodes are connected directly at one point.



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