



SCHOOL OF COMPUTER ENGINEERING
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT)
(Deemed to be University, u/s 3 of UGC Act 1956)

Subject: Computer Networks (5th Semester)

Subject Code: CS-30003

Academic Session: Autumn Semester 2025

Contact hours per week:

3 hours (LTP: 3-0-0)

Course Coordinator: Dr. Jaydeep Das

Syllabus:

UNIT I

Data Communications:

Data Transmission, Multiplexing, Data Encoding Techniques, Introduction to computer networks, Network, Topologies, Reference Models: ISO/OSI Model and TCP/IP Model.

UNIT II

Physical Layer:

Transmission Media, Analog signals, Digital Signals, Data Link Layer, Error Detection and Correction, Parity, LRC, CRC, Hamming Code, Flow Control and Error Control, Stop and wait, ARQ, Sliding window – IEEE, Ethernet.

UNIT III

Network Layer:

Packet Switching and Circuit Switching, IP addressing methods, Subnetting, Super netting, Routing Protocols: IP, ARP, RARP, DHCP, Routing Algorithms: Distance Vector Routing, Link State Routing.

UNIT IV

Transport Layer:

Transport Services, UDP, TCP, Congestion Control, Quality of Services (QOS).

UNIT V

Application Layer:

Domain Name Space (DNS), Electronic Mail, HTTP, WWW.

Course Outcome:

Upon completion of this course, the students will be able to:

CO1: Use of different models for study of computer networks

CO2: Identify the components required to build different types of networks

CO3: Choose the required functionality at each layer for given application

CO4: Identify solution for each functionality at each layer

CO5: Trace the flow of information from one node to another node in the network

CO6: Build networking solutions using the concepts of world wide web and electronic mail technologies

Course Coverage and Delivery Plan:

| Unit Name and SDG Mapping | Topics/Coverage | No. of lectures | Lectures serial nos. |
|--|---|--------------------|---|
| Data Communications (SDG: 09) | <ul style="list-style-type: none"> • Introduction to Computer Networks • Packet Switching and Circuit Switching • Network Topologies • Reference Models: ISO/OSI Model and TCP/IP Model. | 3 | 1-3 Book Chapter: 1 |
| Application Layer (SDG: 08, 11) | <ul style="list-style-type: none"> • Architecture and principles of network applications (client-server, peer-to-peer, hybrid) • WWW and HTTP: Working, Message Formats, URL, Cookies • Electronic Mail: Components and Architecture, SMTP, POP3, IMAP4, MIME • Domain Name Space (DNS) functionality, Architecture, Resolution (iterative and recursive), Resource Records (A, NS, MX, CNAME etc.) | 5 | 4-8 Book Chapter: 10 |
| Transport Layer (SDG: 09, 11) | <ul style="list-style-type: none"> • Introduction to Transport Layer • Transport Layer Services • Multiplexing and de-multiplexing • Flow Control in Transport Layer <ul style="list-style-type: none"> - Stop-and-wait - Go-back-N - Selective-Repeat • UDP: Services and Applications, Segment format • TCP: Services <ul style="list-style-type: none"> - Segment format - TCP Connection management, Timer - State Transition Diagram - Windows in TCP - Flow Control - Congestion Control (Slow start, congestion avoidance, and fast recovery) <p>*****MID SEMESTER*****</p> | 12 | 9-20 Book Chapter: 9 |
| Network Layer (SDG: 09, 11) | <ul style="list-style-type: none"> • Introduction to Network Layer services • IP addressing methods • Subnetting & Super netting • IPv4 datagram format • ICMP • NAT • Routing Algorithms: Distance Vector, Link State, Path Vector • Routing Protocols: RIP, OSPF, BGP (basic) • Protocols: IP, ARP, RARP, DHCP | 12 | 21-32 Book Chapter: 7, 8 |
| Data-Link Layer (SDG: 11, 12) | <ul style="list-style-type: none"> • Error, Detection and Correction methods (Parity, LRC, CRC, Hamming Code) • Media Access Control (Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA) • Ethernet Frame format | 5 | 33-37 Book Chapter: 3, 4 |

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| Physical Layer | <ul style="list-style-type: none">• Analog Signals and Digital Signals• Data Transmission and Multiplexing• Transmission Media | 3 | 38-40 Book Chapter: 2 |
|-----------------------|--|----------|--|

Text Book:

Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition, (ISBN: 978-93-5532-094-0)

Reference Book:

1. W. Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, 2018.
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Sixth Edition, Morgan Kaufmann Publishers, 2011.
3. Nader. F. Mir, "Computer and Communication Networks", First Edition, Pearson Publisher 2007
4. Behrouz A. Forouzan and Firouz Mosharraf, "Computer Networks: A Top-Down Approach", Mc Graw Hill, 2023 (ISBN: 978-93-5532-490-0)

Scheme of Evaluation:

Full marks for the Computer Networks theory is 100, which is divided into the following components.

- Internal Assessment (30 Marks)
- Mid Semester (20 Marks)
- End Semester (50 Marks)

Activity Details and Tentative Schedule:

| Activity | Type | Focus | Date | Marks | CO |
|--|-------------------------------|-----------------------|---|-------|-----|
| 1 | Assignment-1 | Critical Thinking | 4 th week of July, 2025 | 5 | CO1 |
| 2 | Assignment-2 | Critical Thinking | 2 nd week of August, 2025 | 5 | CO2 |
| 3 | Quiz-1 | Quiz | 4 th week of August, 2025 | 5 | CO3 |
| MID SEMESTER Examination [08-13 September 2025] | | | | | |
| 4 | Assignment -3 | Critical Thinking | 4 th week of September, 2025 | 5 | CO4 |
| 5 | Group Activity & Presentation | Creation, Reflections | 2 nd week of October, 2025 | 5 | CO5 |
| 6 | Quiz-2 | Quiz | 4 th week of October, 2025 | 5 | CO6 |
| END SEMESTER Examination [10-19 November 2025] | | | | | |

Note: Defaulter Tests may be conducted for the absentees.

Links to e-resources (NPTEL, YouTube, Swayam, Virtual lab etc)

- <https://www.ietf.org/rfc/rfc793.txt>
- <https://datatracker.ietf.org/doc/html/rfc791>
- <https://datatracker.ietf.org/doc/html/rfc7241>
- <https://datatracker.ietf.org/doc/html/rfc2616>
- <https://www.ietf.org/rfc/rfc1035.txt>
- <https://datatracker.ietf.org/doc/html/rfc5321>