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 Sem. 2024 **Contact hours per week**: 3 hours (LTP: 3-0-0)

Course coordinator: Prof. Niranjan Kumar Ray

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)	• Introduction to Computer Networks • Analog signals and Digital Signals • Data Transmission and Multiplexing • Data Encoding Techniques • Packet Switching and Circuit Switching • Network Topologies • Reference Models: ISO/OSI Model and TCP/IP Model.	**6**	**1-6**
Application Layer (SDG: 08, 11)	• Domain Name Space (DNS) • Electronic Mail • HTTP • Delay and throughput in Packet-switched Network	**5**	**7-11**
Transport Layer (SDG: 09, 11)	• Introduction to Transport Layer • Transport Layer Services • Multiplexing and de-multiplexing • Flow Control in Transport Layer -Stop-and-wait -Go-back-N -Selective-Repeat • UDP: Services and Applications, Segment format • TCP: Services -Segment format -TCP Connection management -State Transition Diagram -Windows in TCP -Flow Control -Congestion Control (Slow start, congestion avoidance, and fast recovery) • Quality of Services (QOS)	**12**	**12-23**
Network Layer (SDG: 09, 11)	• Introduction to Network Layer services • IPv4 datagram format • DHCP • ICMP • NAT • Routing Algorithms: Link state, Distance vector, Path vector • Routing Protocols: OSPF, RIP • IP addressing methods • Subnetting & Super netting • Protocols: IP, ARP, RARP, DHCP	**12**	**24-35**
Physical Layer (SDG: 11, 12)	• Transmission Media • Data Link Layer • Error, Detection and Correction methods (Parity, LRC, CRC, Hamming Code) • Ethernet Frame format	**5**	**36-40**

Text Book:

Data Communications and Networking with TCPIP Protocol Suite, 6th Edition, Behrouz A. Forouzan (ISBN: 9789355320940)

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

Scheme of Evaluation:

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

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

Activity Details and Schedule: (May vary)

Activity	Type	Focus	Date	Marks	CO
1	Assignment-1	Critical Thinking	1st week of August, 24	5	CO1
2	Group Activity & Presentation	Creation, Reflections	4th week of August, 24	5	CO2
3	Quiz-1	Quiz	2nd week of September, 24	5	CO3
4	Assignment -2	Critical Thinking	2nd week of October, 24	5	CO4
5	Assignment-3	Critical Thinking	1st week of November, 24	5	CO5
6	Quiz-2	Quiz	3rd week of November, 24	5	CO6

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