



SRI KRISHNA INSTITUTE OF TECHNOLOGY

(Accredited by NAAC, Approved by A.I.C.T.E. New Delhi, Recognised by Govt. of Karnataka & Affiliated to V.T U., Belgaum)
#29, Chimney Hills, Hesaraghatta Main Road, Chikkabanavara Post, Bangalore- 560090

Department of Artificial Intelligence and Machine Learning

| | |
|---------------------------------|---------------------|
| Academic Year: 2021-2022 | Semester: IV |
| Course Name: Data Communication | Course Code: 18CS46 |
| Total Contact hours: 3 | Credits:3 |
| SEE Marks:60; CIE:40 | Total Marks: 100 |
| Course Plan Author: Ms.Ramya H | Date: 19/05/2022 |

Course Prerequisites: Basics of Analog and Digital concepts.

Course Objectives:

- Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Explain with the basics of data communication and various types of computer networks;
- Demonstrate Medium Access Control protocols for reliable and noisy channels.
- Expose wireless and wired LANs.

Course Outcomes:

- Explain the various components of data communication.
- Understand and analyze the different types of Transmission media.Demonstrate data transmission and data conversion
- Explain the fundamentals of digital communication and switching.
- Compare and contrast data link layer protocols.
- Summarize IEEE 802.xx standards

| CO Number | Course Outcome | Blooms' Level |
|-----------|-----------------------------------------------------------------------------------------------------------------------|---------------|
| CO1 | At the end of the course, student should be able to . . . Explain the various components of data communication. | L1 |
| CO2 | Understand and analyze the different types of Transmission media Demonstrate data transmission and data conversion | L2 |
| CO3 | Explain the fundamentals of digital communication and switching. | L2,L3 |
| CO4 | Compare and contrast data link layer protocols. | L3 |
| CO5 | Summarize IEEE 802.xx standards | L3,L4 |

Program Outcomes and Program Specific Outcomes

| | |
|-----|------------------------------------|
| PO1 | Engineering Knowledge; |
| PO2 | Problem Analysis; |
| PO3 | Design / Development of Solutions; |



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| | |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PO4 | Conduct Investigations of Complex Problems; |
| PO5 | Modern Tool Usage; |
| PO6 | The Engineer and Society; |
| PO7 | Environment and Sustainability; |
| PO8 | Ethics; |
| PO9 | Individual and Teamwork; |
| PO10 | Communication; |
| PO11 | Project Management and Finance; |
| PO12 | Life-long Learning; |
| PSO1 | Graduates will have the ability to adapt, contribute and innovate ideas in the field of Artificial Intelligence and Machine Learning |
| PSO2 | To provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in various domains of Artificial Intelligence and Machine Learning such as Data Science, Computer Vision, Natural Language Processing with ethical values |
| PSO3 | Graduates will acquire the practical proficiency with niche technologies and open source platforms and to become Entrepreneur in the domain of Artificial Intelligence and Machine Learning |

CO – PO Mapping

| Course Outcomes | Program Outcomes | | | | | | | | | | | | | | | |
|-----------------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|--|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | |
| CO1 | 2 | | | | | | | | 2 | | | | 1 | | | |
| CO2 | 2 | 2 | | | | | | | | 1 | | | | | 2 | |
| CO3 | 2 | 2 | | | | 1 | | 1 | | | | | 2 | | | |
| CO4 | 2 | 2 | | | | | | | | | | 2 | 2 | | | |
| CO5 | 2 | | | | 1 | | | | | | | | | | | |

Course Content (Syllabus)

| | |
|----------|---------------|
| Module 1 | Contact Hours |
|----------|---------------|



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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <p>Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration, Networks Models: Protocol Layering, TCP/IP Protocol suite, The OSI model, Introduction to Physical Layer-1: Data and Signals, Digital Signals, Transmission Impairment, Data Rate limits, Performance.</p> <p>Textbook1: Ch 1.1 to 1.5, 2.1 to 2.3, 3.1, 3.3 to 3.6</p> <p>RBT: L1, L2</p> | 08 |
| Module 2 | |
| <p>Digital Transmission: Digital to digital conversion (Only Line coding: Polar, Bipolar and Manchester coding).</p> <p>Physical Layer-2: Analog to digital conversion (only PCM), Transmission Modes,</p> <p>Analog Transmission: Digital to analog conversion.</p> <p>Textbook1: Ch 4.1 to 4.3, 5.1</p> <p>RBT: L1, L2</p> | 08 |
| Module 3 | |
| <p>Bandwidth Utilization: Multiplexing and Spread Spectrum,</p> <p>Switching: Introduction, Circuit Switched Networks and Packet switching.</p> <p>Error Detection and Correction: Introduction, Block coding, Cyclic codes, Checksum,</p> <p>Textbook1: Ch 6.1, 6.2, 8.1 to 8.3, 10.1 to 10.4</p> <p>RBT: L1, L2</p> | 08 |
| Module 4 | |
| <p>Data link control: DLC services, Data link layer protocols, Point to Point protocol (Framing, Transition phases only).</p> <p>Media Access control: Random Access, Controlled Access and Channelization,</p> <p>Introduction to Data-Link Layer: Introduction, Link-Layer Addressing, ARP</p> <p>IPv4 Addressing and subnetting: Classful and CIDR addressing, DHCP, NAT</p> <p>Textbook1: Ch 9.1, 9.2, 11.1, 11.2 11.4, 12.1 to 12.3, 18.4</p> <p>RBT: L1, L2</p> | 08 |
| Module 5 | |
| <p>Wired LANs Ethernet: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet,</p> <p>Wireless LANs: Introduction, IEEE 802.11 Project and Bluetooth.</p> <p>Other wireless Networks: Cellular Telephony</p> <p>Textbook1: Ch 13.1 to 13.5, 15.1 to 15.3, 16.2RBT: L1, L2</p> | 08 |

Schedule of Instruction

| Sl.no | Class no | Module | Topic | Reference (Book, Page no.) | Course Outcome | Delivery mode |
|-------|----------|-----------------|----------------------------------------------------|----------------------------|----------------|---------------|
| 1 | 1 | Module1: | Introduction: Data Communications, Networks | T1, 3-6 | CO1 | ICT |



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|----|----|------------------|-----------------------------------------------------------------------------|-------------|-----|-----------------|
| 2 | 2 | | Network Types | T1,13-18 | CO1 | ICT |
| 3 | 3 | | Internet History, Standards and Administration, | T1,19-24 | CO1 | ICT |
| 4 | 4 | | Networks Models: Protocol Layering, | T1,31-35 | CO1 | ICT |
| 5 | 5 | | TCP/IP Protocol suite | T1,35-43 | CO1 | ICT |
| 6 | 6 | | The OSI model, | T1,44-45 | CO1 | ICT |
| 7 | 7 | | Introduction to Physical Layer-1: Data and Signals, Digital Signals, | T1,51-70 | CO1 | ICT |
| 8 | 8 | | Transmission Impairment, Data Rate limits, Performance. | T1,76-88 | CO1 | ICT |
| 9 | 9 | Module 2: | Digital Transmission: Digital to digital conversion | T1,95-113 | CO2 | ICT |
| 10 | 10 | | Only Line coding: Polar, Bipolar | T1,115-126 | CO2 | ICT,Black board |
| 11 | 11 | | Manchester coding | T1,115-126 | CO2 | ICT |
| 12 | 12 | | Manchester coding | T1,115-126 | CO2 | ICT |
| 13 | 13 | | Physical Layer-2: Analog to digital conversion (only PCM) | T1,147-149 | CO2 | ICT |
| 14 | 14 | | Transmission Modes | T1, 147-149 | CO2 | ICT |
| 15 | 15 | | Transmission Modes | T1, 147-149 | CO2 | ICT |
| 16 | 16 | | Analog Transmission: Digital to analog conversion. | T1,136-146 | CO2 | ICT |
| 17 | 17 | | Analog Transmission: Digital to analog conversion. | T1,136-146 | CO2 | ICT |
| 18 | 18 | Module 3: | Bandwidth Utilization: Multiplexing and Spread Spectrum. | T1,156-178 | CO3 | ICT |
| 19 | 19 | | Switching: Introduction, | T1,207-209 | CO3 | ICT |
| 20 | 20 | | Circuit Switched Networks | T1,209-213 | CO3 | ICT |
| 21 | 21 | | Packet switching | T1,213-216 | CO3 | ICT |
| 22 | 22 | | Packet switching | T1,213-216 | CO3 | ICT |



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|----|----|----------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------|------------|------------------|
| 23 | 23 | | Error Detection and Correction: Introduction | T1,257-259 | CO3 | ICT, Black board |
| 24 | 24 | | Error Detection and Correction: Introduction | T1,257-259 | CO3 | ICT |
| 25 | 25 | | Block coding | T1,259 | CO3 | Black board |
| 26 | 26 | | Cyclic codes | T1,264-274 | CO3 | Black board |
| 27 | 27 | | Checksum | T1,277-281 | CO3 | ICT |
| 28 | 28 | Module 4: | Data link control: DLC services, Data link layer protocols | T1,293-298 | CO4 | ICT |
| 29 | 29 | | Point to Point protocol (Framing, Transition phases only). | T1,309-312 | CO4 | ICT |
| 30 | 30 | | Media Access control: Random Access, | T1,326-338 | CO4 | ICT |
| 31 | 31 | | Controlled Access and Channelization, | T1,341-347 | CO4 | ICT |
| 32 | 32 | | Introduction to Data-Link Layer: Introduction, | T1,235-242 | CO4 | ICT |
| 33 | 33 | | Link-Layer Addressing, ARP | T1,242-248 | CO4 | ICT |
| 34 | 34 | | IPv4 Addressing and subnetting: Classful and CIDR addressing | T1,528-532 | CO4 | ICT |
| 35 | 35 | | DHCP | T1,539 | CO4 | ICT |
| 36 | 36 | | NAT | T1,543 | CO4 | ICT |
| 37 | 37 | | Module 5: | Wired LANs Ethernet: Ethernet Protocol | T1,362-363 | CO5 |
| 38 | 38 | Standard Ethernet, Fast Ethernet | | T1,364-377 | CO5 | ICT |
| 39 | 39 | GigabitEthernet | | T1,379-381 | CO5 | ICT |
| 40 | 40 | 10 Gigabit Ethernet | | T1,382 | CO5 | ICT |
| 41 | 41 | Wireless LANs: Introduction | | T1,436-438 | CO5 | ICT |
| 42 | 42 | IEEE 802.11 Project | | T1,439-448 | CO5 | ICT |
| 43 | 43 | Bluetooth. | | T1,451-452 | CO5 | ICT |
| 44 | 44 | Other wireless Networks: Cellular Telephony | | T1,470-482 | CO5 | ICT |
| 45 | 45 | Revision | | | | ICT |
| 46 | 46 | Revision | | | | ICT |

*L – Lecture, V- Videos or any other mode



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| Textbooks | |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| T1 | Behrouz A. Forouzan, Data Communications and Networking 5E, 5 th Edition, Tata McGraw-Hill, 2013. |
| Reference books | |
| R1 | Alberto Leon-Garcia and IndraWidjaja: Communication Networks - Fundamental Concepts andKey architectures, 2nd Edition Tata McGraw-Hill, 2004. |
| R2 | William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007. |
| R3 | Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition,Elsevier, 2007. |
| R4 | Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007. |

| Web links and Video Lectures (e-Resources): | |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | https://sites.google.com/skit.org/in/dc-18cs46/home |
| 2 | https://www.techopedia.com/definition/6765/data-communications-dc |
| 3 | https://www.javatpoint.com/data-link-layer |
| 4 | |
| 5 | |

| Assessment Schedule: | | | | | | |
|----------------------|-----------------------------------|------------|---------|-------------------|-------|-------------|
| Sl.No | Assessment type | Contents | CO | Duration In Hours | Marks | Date & Time |
| 1 | CIE Test 1 | Module 1,2 | CO1,CO2 | 1:15 | 30 | |
| 2 | CIE Test 2 | Module 3,4 | CO3,CO4 | 1:15 | 30 | |
| | CIE Test 3 | Module 5 | CO5 | 1:15 | 30 | |
| 3 | Assignment 1 | Module1,2 | | | 10 | |
| 4 | Assignment 2 | Module 3,4 | | | 10 | |
| 5 | Seminar (or any planned activity) | Module 5 | | | 10 | |

Seminar: Group of 6-8 students
Module 1,2,3,4 & 5

****The sum of total marks of three tests, two assignments, and seminar will be out of 100 marks and will be scaled down to 50 marks.**



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CIE + SEE = 50 + 50 = 100 marks

Faculty Incharge

DAC Chairman

*** Please mention as per the scheme.*