



**Electronics-II**  
**Digital Communication and Networking**  
**[CORE COURSE]**

<b>Semester: III</b>	<b>Credits: 2</b>	<b>Subject Code: BS32106</b>	<b>Lectures: 36</b>
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<b>Course Outcomes:</b>
<p><b>At the end of the course, the learner will be able to -</b></p> <ul style="list-style-type: none"> <li>• Explain the basic knowledge of the communication system and differentiate between them.</li> <li>• Recognize the need for data coding and error detection/correction mechanisms.</li> <li>• Recall and identify different modulation techniques.</li> <li>• Explain multiplexing techniques and comparison between them, to know data link layer protocol: Media Access Control</li> <li>• Compare and contrast OSI and TCP/IP models of Networking, identify functions of data link layer and network layer while accessing communication link.</li> <li>• Apply appropriate and advanced techniques to build the computer network.</li> </ul>

<b>Unit 1: Introduction to Electronic Communication</b>	<b>9</b>
<ul style="list-style-type: none"> <li>• Introduction to Communication: Elements of Communication system, types of noise sources, Electromagnetic spectrum, signal and channel bandwidth,</li> <li>• Types of communication: simplex, half duplex, full duplex, baseband and broadband, Serial communication: asynchronous and synchronous</li> <li>• Information Theory: Information entropy, rate of information (data rate, baud rate), channel capacity, Nyquist theorem, Signal to noise ratio, Noise Figure, Shannon theorem,</li> <li>• Error handling codes: Necessity, Hamming code, CRC</li> </ul>	

<b>Unit 2: Modulation and Demodulation</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• Introduction to modulation and demodulation: Concept and need of modulation and demodulation,</li> <li>• Digital Modulation techniques: Pulse Code Modulation (PCM), FSK, QPSK, QAM.</li> </ul>	

<b>Unit 3: Multiplexing, Spectrum Spreading and Media Access Control</b>	<b>12</b>
<ul style="list-style-type: none"> <li>• Multiplexing techniques: Frequency division multiplexing, wavelength division multiplexing, Time division multiplexing Spread Spectrum techniques: Frequency hopping Spread Spectrum, Direct Sequence Spread Spectrum</li> <li>• Media Access Control (MAC): Random Access Protocol: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access Protocols: Reservation, Polling, and Token passing, Channelization Protocols: FDMA, TDMA, and CDMA.</li> </ul>	

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<b>Unit 4: Computer Networking</b>	<b>10</b>
<ul style="list-style-type: none"> <li>• Introduction to computer networks</li> <li>• Types of networks: LAN, MAN, WAN, Wireless networks, Switching, Internet,</li> <li>• Network topology: point to point, Star, Ring, Bus, Mesh, Tree, Daisy Chain, Hybrid</li> <li>• Network devices: Repeater, Switch, Networking cables, Router, Bridge, Hub, Brouter, Gateway. Wired LANs: - Ethernet: Ethernet protocol, standard Ethernet, 100 MBPS Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet,</li> <li>• Computer network model: OSI and TCP/IP.</li> <li>• Ethernet: Ethernet protocol, standard Ethernet, 100 MBPS Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet.</li> <li>• Computer network model: OSI and TCP/IP.</li> </ul>	

<b>Reference Books:</b>
<ul style="list-style-type: none"> <li>• Forouzan, <i>Data Communication and Networking</i>, Mc Graw Hill publication, 5th edition-2012</li> <li>• Frenzel, <i>Communication Electronics: Principles and Applications</i>, Tata Mc Graw Hill publication, 4th edition. -2015</li> <li>• ISRD group , <i>Data communication and computer network</i>, The Mcgraw hill,2007 edition</li> <li>• Tanenbaum,<i>Computer Networks</i>, PHI publication, 5th edition- 2013</li> <li>• Theodore S. Rappaport,<i>Wireless communication</i>, PHI learning private ltd,2002 edition</li> </ul>

<b>Websites:</b>
<ul style="list-style-type: none"> <li>• <a href="https://nptel.ac.in/content/storage2/courses/117105076/pdf/1.1%20Lesson%201.pdf">https://nptel.ac.in/content/storage2/courses/117105076/pdf/1.1%20Lesson%201.pdf</a></li> <li>• <a href="https://nptel.ac.in/content/storage2/courses/117105076/pdf/2.1%20Lesson-2.pdf">https://nptel.ac.in/content/storage2/courses/117105076/pdf/2.1%20Lesson-2.pdf</a></li> <li>• <a href="http://ndl.iitkgp.ac.in/document/QXBqK1czOUpyM3FlamVjTmREMWFEUG81WWlpcnM3b1IUYUJINH1L21FeGtPTENpNWJtVXEzaVFxNTZ1TGt3bQ">http://ndl.iitkgp.ac.in/document/QXBqK1czOUpyM3FlamVjTmREMWFEUG81WWlpcnM3b1IUYUJINH1L21FeGtPTENpNWJtVXEzaVFxNTZ1TGt3bQ</a></li> <li>• <a href="http://ndl.iitkgp.ac.in/document/QXBqK1czOUpyM3FlamVjTmREMWFEQkJuUIZCQWRqc3B3MVR1Y0crQ3pyOEYrVmZ6aDlqYVBXTURFQ1d2ekdnUA">http://ndl.iitkgp.ac.in/document/QXBqK1czOUpyM3FlamVjTmREMWFEQkJuUIZCQWRqc3B3MVR1Y0crQ3pyOEYrVmZ6aDlqYVBXTURFQ1d2ekdnUA</a></li> <li>• <a href="https://nptel.ac.in/content/storage2/courses/106106091/pdf/Lecture38_TCPProtocol.pdf">https://nptel.ac.in/content/storage2/courses/106106091/pdf/Lecture38_TCPProtocol.pdf</a></li> <li>• <a href="http://ndl.iitkgp.ac.in/document/eUJ5RFk4S3pISG1McXpCN2JPTk1QKzhWR2FFeFFMNHFwMkFXZXVUwFVKTCtIVXdLL2RrOTE5eU9OR0RnMXZKYg">http://ndl.iitkgp.ac.in/document/eUJ5RFk4S3pISG1McXpCN2JPTk1QKzhWR2FFeFFMNHFwMkFXZXVUwFVKTCtIVXdLL2RrOTE5eU9OR0RnMXZKYg</a></li> <li>• <a href="http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMxhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbkdps3VqQjFueHZ5OUplWDQvd08yZEZXTWNKNkxUZ3Z2OThKWjM4dzJnTke9PQ">http://ndl.iitkgp.ac.in/document/TVBkSVpKTGZKMxhTTXJaYkIyeisrUWpvdGVGRzdVbjJhY1BJS05XTHNTbkdps3VqQjFueHZ5OUplWDQvd08yZEZXTWNKNkxUZ3Z2OThKWjM4dzJnTke9PQ</a></li> <li>• <a href="https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7">https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7</a></li> <li>• <a href="https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7">https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=7</a></li> </ul>

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