

**COURSE MODULE FOR THE SESSION 2024-25(ODD SEMESTER)**

## Course Syllabi with CO's

Academic Year: 2024 - 2025							
Department: Computer Science & Engineering - Data Science							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BCS502	Computer Networks	Core	Fundamentals of computers, Operating systems, Basic Mathematics	3	-	2	40T + 20P

**Objectives:**

- Study the TCP/IP protocol suite, switching criteria and Medium Access Control protocols for reliable and noisy channels.
- Learn network layer services and IP versions.
- Discuss transport layer services and understand UDP and TCP protocols.
- Demonstrate the working of different concepts of networking layers and protocols.

**Topics Covered as per Syllabus**

**Module -1**  
Introduction: Data Communications, Networks, Network Types, Networks Models: Protocol Layering, TCP/IP Protocol suite, The OSI model, Introduction to Physical Layer: Transmission media, Guided Media, Unguided Media: Wireless. Switching: Packet Switching and its types.

**Module -2**  
Data Link Layer: Error Detection and Correction: Introduction, Block Coding, Cyclic Codes. Data link control: DLC Services: Framing, Flow Control, Error Control, Connectionless and Connection Oriented, Data link layer protocols, High Level Data Link Control. Media Access Control: Random Access, Controlled Access. Check Sum and Point to Point Protocol

**Module -3**  
Network Layer: Network layer Services, Packet Switching, IPv4 Address, IPv4 Datagram, IPv6 Datagram, Introduction to Routing Algorithms, Unicast Routing Protocols: DVR, LSR, PVR, Unicast Routing protocols: RIP, OSPF, BGP, Multicasting Routing-MOSPF

**Module -4**  
Introduction to Transport Layer: Introduction, Transport-Layer Protocols: Introduction, User Datagram Protocol, Transmission Control Protocol: services, features, segments, TCP connections, flow control, Error control, Congestion control.

**Module - 5**  
Introduction to Application Layer: Introduction, Client-Server Programming, Standard Client-Server Protocols: World Wide Web and HTTP, FTP, Electronic Mail, Domain Name System (DNS), TELNET, Secure Shell (SSH)

<b>TextBooks:</b>	
1. Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, Tata McGraw-Hill, 2013.	
<b>Reference Books</b>	
1. Larry L. Peterson and Bruce S. Davie: Computer Networks - A Systems Approach, 4th Edition, Elsevier, 2019. 2. Nader F. Mir: Computer and Communication Networks, 2nd Edition, Pearson Education, 2015. 3. William Stallings, Data and Computer Communication 10th Edition, Pearson Education, Inc., 2014.	
List of URL's	
1. <a href="https://www.digimat.in/nptel/courses/video/106105183/L01.html">https://www.digimat.in/nptel/courses/video/106105183/L01.html</a> 2. <a href="http://www.digimat.in/nptel/courses/video/106105081/L25.html">http://www.digimat.in/nptel/courses/video/106105081/L25.html</a> 3. <a href="https://nptel.ac.in/courses/10610">https://nptel.ac.in/courses/10610</a>	
<b>Course outcomes:</b> The students should be able to:	
At the end of the course, the student will be able to: <ul style="list-style-type: none"> <li>▪ <b>Explain</b> the fundamentals of computer networks.</li> <li>▪ <b>Apply</b> the concepts of computer networks to demonstrate the working of various layers and protocols in communication network.</li> <li>▪ <b>Analyze</b> the principles of protocol layering in modern communication systems.</li> <li>▪ <b>Demonstrate</b> various Routing protocols and their services using tools such as Cisco packet tracer.</li> </ul>	
<b>Internal Assessment Marks: 40 (3 Session Tests are conducted during the semester and Marks allotted based on average of all performances).</b>	
<b>PRACTICAL COMPONENT OF IPCC</b> <ol style="list-style-type: none"> <li>1. Implement three nodes point - to - point network with duplex links between them. Set the queue size, vary the bandwidth, and find the number of packets dropped.</li> <li>2. Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.</li> <li>3. Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.</li> <li>4. Develop a program for error detecting code using CRC-CCITT (16- bits).</li> <li>5. Develop a program to implement a sliding window protocol in the data link layer.</li> <li>6. Develop a program to find the shortest path between vertices using the Bellman-Ford and path vector routing algorithm.</li> <li>7. Using TCP/IP sockets, write a client - server program to make the client send the file name and to make the server send back the contents of the requested file if present.</li> <li>8. Develop a program on a datagram socket for client/server to display the messages on client side, typed at the server side.</li> <li>9. Develop a program for a simple RSA algorithm to encrypt and decrypt the data.</li> <li>10. Develop a program for congestion control using a leaky bucket algorithm.</li> </ol>	

**The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)**

Subject Code	BCD502				Title: Computer Networks								
List of Course Outcomes	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Total
CO-1	2	1		-	-	-	-	-	-	-	-	-	3
CO-2	2	2		-	-	-	-	-	-	-	-	-	4
CO-3	2	1		-	-	-	-	-	-	-	-	-	3
CO-4	2	1		-	-	-	-	-	-	-	-	-	3
<b>Total</b>													13

**The Correlation of Program Specific Outcome's (PS0's) and Course Outcome (CO's)**

Subject Code	BCD502	Title: Computer Networks	
List of Course Outcome's	PSO1	PSO2	Total
CO-1	-	1	1
CO-2	-	1	1
CO-3	-	1	1
CO-4	-	1	1
<b>Total</b>	-	-	4

**Note:** 3 = Strong Contribution    2 = Average Contribution    1= Weak Contribution    - = No Contribution