COURSE MODULE FOR THE SESSION 2025-2026 (ODD SEM)

Course Syllabi with CO's

Faculty Name:							**Academic Year: 2025 - 2026**
Department: CSE							
Course Code	**CourseTitle**	**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

Course Learning Objectives: This course will enable students to:

- **Explain** the fundamentals of computer networks.
- **Apply** the concepts of computer networks to demonstrate the working of various layers and protocols in communication network.
- **Analyze** the principles of protocol layering in modern communication systems.
- **Demonstrate** various Routing protocols and their services using tools such as Cisco packet tracer.

Module 1	**Contact Hours**
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. **Textbook**: Ch. 1.1 - 1.3, 2.1 - 2.3, 7.1 – 7.3, 8.3.	8
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 **Textbook**: Ch. 10.1-10.4, 11.1 -11.4, 12.1 - 12.2	8
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 **Textbook**: Ch. 18.1, 18.2, 18.4, 22.2,20.1-20.3, 21.3.2	8
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. **Textbook**: Ch. 23.1- 23.2, 24.1-24.3.4, 24.3.6-24.3.9	8
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) **Textbook**: Ch. 25.1-25.2, 26.1-26.6	8

PRACTICAL COMPONENT OF IPCC

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.
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.
3. Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
4. Develop a program for error detecting code using CRC-CCITT (16- bits).
5. Develop a program to implement a sliding window protocol in the data link layer.
6. Develop a program to find the shortest path between vertices using the Bellman-Ford and path vector routing algorithm.
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.
8. Develop a program on a datagram socket for client/server to display the messages on client side, typed at the server side.
9. Develop a program for a simple RSA algorithm to encrypt and decrypt the data.
10. Develop a program for congestion control using a leaky bucket algorithm.

TextBooks:

1. Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, Tata McGraw-Hill,2013.

Reference Books

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. https://www.digimat.in/nptel/courses/video/106105183/L01.html 2. http://www.digimat.in/nptel/courses/video/106105081/L25.html 3. https://nptel.ac.in/courses/10610
Course outcomes: The students should be able to:
At the end of the course, the student will be able to: ▪ Explain the fundamentals of computer networks. ▪ Apply the concepts of computer networks to demonstrate the working of various layers and protocols in communication network. ▪ Analyze the principles of protocol layering in modern communication systems. ▪ Demonstrate various Routing protocols and their services using tools such as Cisco packet tracer.

Internal Assessment Marks: 40 (3 Session Tests are conducted during the semester and Marks allotted based on average of all performances).

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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	Total
CO-1	2	1		-	-	-	-	-	-	-	-	3
CO-2	2	2		-	-	-	-	-	-	-	-	4
CO-3	2	1		-	-	-	-	-	-	-	-	3
CO-4	2	1		-	-	-	-	-	-	-	-	3
Total	8	5										13

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

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO'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
Total	-	4	4

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