Vidyavardhaka Sangha®, Mysore
VIDYAVARDHAKA COLLEGE OF ENGINEERING
Autonomous Institute, affiliated to Visvesvaraya Technological University, Belagavi
(Approved by AICTE, New Delhi & Government of Karnataka)
Accredited by NBA (CV, CS, EE, EC, IS & ME) | NAAC with 'A' Grade
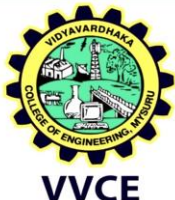P.B. No. 206, Gokulam III Stage, Mysuru-570 002, Karnataka, India
Phone: +91 821 4276201 /202 /225, Fax: +91 824 2510677
Web: http://www.vvce.ac.in

VVCE

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SEMESTER – V

Course Name	: Computer Networks	Course Code:	BCSCN501
Number of Lecture Hours / Week	: 03	CIE Marks:	50
Number of Tutorial / Practical Hours / Week	: 02	SEE Marks:	50
Total Number of Lecture + Tutorial/Practical Hours	: 40+24=64	SEE Duration:	03 Hrs.
L:T:P	: 3:0:2	Credits:	04

Course Prerequisites
Basic knowledge of problem-solving skills, Computer hardware are required to learn the course.

Course Overview
This course will enable students to,
This course provides fundamental understanding of all the layers for TCP/IP model and different protocols used in the layers. Provides basic knowledge of different types of networks and their applications.

Course Learning Objectives (CLOs)
- Study the TCP/IP protocol suite, switching criteria and Medium Access Control protocols for reliable and noisy channels.
- Study 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.

Modules	Teaching Hours
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. **SLT**: Switching: Packet Switching and its types. **Textbook:** Ch. 1.1 - 1.3, 2.1 - 2.3, 7.1 – 7.3, 8.3.	08
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**.** **SLT :** Check Sum and Point to Point Protocol **Textbook :** Ch. 10.1-10.4, 11.1 -11.3, 12.1 - 12.2	08
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 **SLT**: Multicasting Routing-MOSPF **Textbook 1:** Ch. 18.1, 18.2, 18.4, 22.2,20.1-20.3, 21.3.2	08
Module 4	08

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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. **SLT**: Transport Layer Protocols **Textbook 1:** Ch. 23.1- 23.2 , 24.1-24.3.4, 24.3.6-24.3.9	
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) **SLT: TELNET, Secure Shell (SSH)** **Textbook 1:** Ch. 25.1-25.2, 26.1-26.6	**08**

Part – A
Practical Module

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

Part - B

Open Ended Experiments

1. Given a graph with adjacency list representation of the edges between the nodes, the task is to implement Dijkstra's Algorithm for single-source shortest path using Priority Queue in Java.
2. Implementation of stop and wait protocol using socket programming.
3. Implementation of group chat application using multicast socket Programming.
4. Implementation of address resolution protocol.
5. Implementation of Open Shortest Path First (OSPF).

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Type of Experiment	Program Number	Weightage
Demonstration	1,2,3,4	36%
Exercise	5,6,7,8	36%
Structured Enquiry	9,10	18%
Open ended		10%

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

Reference Books
1. 1. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2019.
2. 2. Nader F. Mir: Computer and Communication Networks, 2nd Edition, Pearson Education, 2015.
3. 3. William Stallings, Data and Computer Communication 10th Edition, Pearson Education, Inc., 2014.

Course Outcomes (COs)
At the end of the course students will be able to

CO1	**Explain** the fundamentals of computer networks.
CO2	**Apply** the concepts of computer networks to **demonstrate** the working of various layers and protocols in communication network.
CO3	**Analyze** the principles of protocol layering in modern communication systems.
CO4	**Simulate/Design & Demonstrate** various Routing protocols and their services using tools such as Cisco packet tracer, Wireshark and so on

CO – PO – PSO Matrix															
CO	**PO**												**PSO**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2													2	
CO2	2													2	
CO3		2												2	
CO4			2		2					2				2	
AVG	**2**	**2**	**2**		**2**					**2**				**2**	