Gyanmanjari
Innovative University

Subject: Data Communications and Networking - MCAXX11504

Type of course: Minor Stream

Prerequisite: Basic Knowledge of Computer Network

Rationale:

Increasing dependence on technology: In today's world, there is a growing dependence on technology for communication and business operations. As a result, understanding the underlying principles of data communications and networking is crucial.

Enabling communication: Data communications and networking are essential for enabling communication between different devices and systems. It allows data to be transmitted and received, enabling businesses to operate smoothly.

Security: With the rise of cyber attacks and data breaches, it is crucial to understand the security risks associated with data communications and networking. This subject helps to identify and mitigate these risks.

Advancements in technology: The field of data communications and networking is constantly evolving, with new technologies and protocols being developed. A strong foundation in this subject is necessary to keep up with these advancements.

Career opportunities: With the increasing demand for technology professionals, a strong understanding of data communications and networking can lead to a wide range of career opportunities in fields such as IT, networking, and cyber security

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	150

Legends: CI-ClassRoom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Presentation :** Faculty will assign topics and students have to prepare presentation on it and upload it on Moodle.	10
2	**MCQ Test :** A MCQ test will be taken on the moodle platform.	10
3	**Assignment :** Assignment of 10 questions will be given; Students have to upload the solved assignment on the moodle.	10
4	**Simulation :** Create a network simulation in Packet Tracer tool on given problem and upload image of that network on moodle.	10
5	**Attendance**	10
	Total	50

CourseContent:

Sr. No	Course content	Hrs	% Weightage
1	**Data Communication Fundamentals and LAN Technology** What is Data Communication and Networks? Features, Advantages and Disadvantages, Data Transmission Modes (Simplex, Half Duplex and Full Duplex), Types of Connection (Point to Point and Multiport) ,Types of Computer Network (LAN, MAN, WAN) , File Server, Application Server, Mail Server, Web Server, Database Server , Topology - Bus, Ring, Star, Tree, Mesh ,Hybrid Repeater, Hub, Switch, Router, Bridge, and Gateway.	07	20
2	**Physical Layer** Guided and Unguided, Twisted Pair, Coaxial Cables, Fiber Optics ,Radio Waves and Micro Waves ,circuit switching, packet switching, message switching, Amplitude Modulation, Frequency Modulation, Phase Modulation, Digital modulation Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying	09	20
3	**Data Link Layer** Design issues ,Error detection and correction link protocols ,Sliding window protocols, Medium access sub layer -	09	20

	channel allocations , ALOHA Protocols ,Carrier Sense Multiple Access Protocols (CSMA) ,CSMA with Collision Detection , Collision free protocols , IEEE 802 standards ,Data link layer switching.		
4	**Transport Layer** Design issue, Connection management, Transmission Control Protocol (TCP) - introduction, window management ,User Datagram Protocol, Performance issues. Transport Services, Elements of Transport protocols Connection establishment, connection release Error control, flow control	09	20
5	**Application Layer** Domain Name Services, Electronic mail WWW, Hypertext Transfer Protocol Network security - basics of cryptography and compression techniques.	08	20

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	20%	10%	00%	00%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand the fundamentals of data communications and networking, including network topologies, protocols, and services.
CO2	Design and implement computer networks that meet the requirements of different organizations, using appropriate hardware and software components.
CO3	Analyze network performance and troubleshoot common network problems using a variety of tools and techniques.
CO4	Communicate technical concepts effectively to both technical and non-technical stakeholders. Work effectively in teams and manage network projects from conception to implementation.
CO5	Stay up-to-date with the latest developments in the field of data communications and networking, including emerging technologies and protocols.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] "Computer Networks" by Andrew S Tanenbaum, David. J. Wetherall

[2] Data Communications and Networking by Behrouz A. Forouzan

[3] Computer Networks by Bhushan H Trivedi

[4] "Computer Networks: A Systems Approach" by Larry L. Peterson, Bruce S. Davie

[5] Data and Computer Communication by W. Stallings; McMillan