ITE3001	Data Communication and Computer Networks	L	T	P	J	C
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Pre-requisite	**ITE1004**	**Syllabus version**				
		1.1				

Course Objectives:

- To learn the principles of computer networks through the Internet protocol stack and the OSI model
- To introduce the basics of data communication and the functions of layered structure.
- To understand the concepts of Error Control and Flow Control Protocols, various Routing and Congestion Control Algorithms, Network Management and Performance Analysis.

Expected Course Outcome:

1) Demonstrate the knowledge of fundamental elements and concepts related to data communication and Networks
2) Analyse the physical layer transmission medium concepts to meet the challenges in implementing Computer Networks.
3) Identify and Analyse the Data link layer error and flow control issues in Computer Networks
4) Examine the applications of Medium Access control Protocol in LAN standards and its switching methods in Networks.
5) Provide solutions such as reliability, scalability and robustness of routing algorithm and congestion control in Networks.
6) Analyze, design, and implement the Internetworks by using IP addresses and routing protocol.
7) Examine the services and Analyze the protocols of Transport and Application Layers.
8) Demonstrate, Design and Analyze the various network topologies and protocols using network tools.

Student Learning Outcomes (SLO):	**1, 2, 5**

[1] Having an ability to apply knowledge of mathematics, science, and engineering

[2] Having a clear understanding of the subject related concepts and of contemporary issues

[5] Having design thinking capability

Module:1	**Introduction**	**5 hours**

Uses of Computer Networks – Network Hardware – Network Software – Reference Models – Network Standardization.

Module:2	**Physical layer**	**5 hours**

Basis for Data Communication - Guided Transmission Media – Wireless Transmission – Digital Modulation and Multiplexing – PSTN.

Module:3	**Datalink layer**	**7 hours**
Design Issues – Error Detection and Correction –Protocols – ARQ - Sliding Window Protocols.		
Module:4	**Mac Sub Layer**	**6 hours**
Channel Allocation Problems – MAC – Ethernet – Datalink Layer Switching.		
Module:5	**Network layer**	**8 hours**
Design Issues – Routing Algorithms – Congestion Control Algorithms.		
Module:6	**Internetworking**	**5 hours**
IPv4- IP address – IPv6 - OSPF-BGP.		
Module:7	**Transport layer**	**7 hours**
Transport Services – Elements – Congestion Control – QoS - UDP – TCP - Application Layer – DNS – Email – WWW – HTTP.		
Module:8	**Contemporary issues:**	**2 hours**
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Andrew S Tanenbaum and David J. Wetherall, Computer Networks, Fifth Edition, Pearson Publisher, 2010.
Reference Books	
1.	Behrouz A Forouzan, Data communication and Networking, McGraw-Hill, Fifth Edition, New York, 2012.
List of Challenging Experiments (Indicative)	
1.	There are 20PC's in your network. Five PC's are connected to one Ethernet hub, and five PC's are connected to another hub. Each hub is connected to separate switch and both the switches are connected to a separate router. The routers are connected via an Ethernet bridge. The remaining 10 PC's are connected directly to one of the two switches. How many Ethernet segments are there? Implement this scenario using cisco packet tracer.
2.	Two PC's are located in adjacent rooms and a third PC is in a building 300 yards away. Explain how you could connect the three PC's in a single network. Implement this scenario using cisco packet tracer.
3.	In CRC error correction scheme, choose pattern 1101 and data 100100. Write a code to encode the given data.
4.	There is trouble ticket raised by users of an organization that their files are not getting uploaded in ftp server. Measure the performance between the ftp server and client and diagnose using iperf tool.
5.	A company needs is granted the site address 201.70.64.0. The company needs six subnets. Design the subnets using cisco packet tracer.

6.	In an IPv4 packet the value of header length is 1000 in binary. Write a code to find, how many bytes of options are being carried by this packet?
7.	Write a code to implement border gateway protocol (BGP).
8.	Implement a TCP/IP socket based ATM System. Make the server to maintain the customer details (name, card no, pin and balance). When a client wants to withdraw amount, validate his login with card no & pin, display a welcome message and perform the withdraw operation if he is having sufficient balance or display a warning message.
9.	Write a UDP based server code to get the date of birth of the client and calculate the age as on today. Client has to enter year, month and day of birth. For example, if the date of birth of a user is 1/07/2001 then his age is 14 years 0 months and 17 days if today's date is 18/07/2015. Get today's date from the server.
10.	A reputed organization has two branches in Vellore. In one of the branch office a new manager has been appointed. The Senior Manager from the main office has to send the important records to the branch office. Implement a client server model to accomplish this.
11.	The finance office of VIT wishes to make the transactions more secured. If you are a programmer how you will implement a system to validate the login credentials obtained from the user thereby denying the access to unauthorized users.
12.	Establish a wired network running many applications level services and measure the performance of same. Establish a wireless network running many applications level services and measure the performance of same. Compare the performance of above two scenarios and list out the challenges.

		Total Laboratory Hours	30 hours
Recommended by Board of Studies	05-03-2016		
Approved by Academic Council	No. 40	Date	18-03-2016