ECEXXX(S): Fundamentals of Network Communication

Programme: B.Tech. ECE/CCE   **Year:** 4th   **Semester :** Even/Summer
Course : Program Elective   **Credits :**3   **Hours :**10+ 30(SS)

Course Context and Overview (100 words): To understand the complex communication network one should first know evolution of networks and identify the key concepts and functions that form the basis for layered architecture. The examples of protocols and services that are used widely will be introduced how and these services are supported by networks. Further fundamental concepts in digital communication, in particular error control techniques, basic queuing theory will be taught. In the last student will also learn about protocols and routing mechanisms.

Prerequisites Courses: C programming

Course outcomes(COs):

On completion of this course, the students will have
CO1:knowledge of how services are influencing the evolution of modern networks, and examples of protocols and services in communication network.
CO2 the ability to understand need of layered architecture of network as well as OSI or TCP/IP use cases in a communication process and routing
CO3 the ability to develop codes for digital Transmission using Socket API
CO4 understanding about queuing theory and its application.
CO5 the knowledge of routing mechanism and higher layer protocols in communication network.

Course Topics:

Topics	Lecture Hours	
UNIT - I 1. **Communication Network and services**	**6**	
1.1 Evolution of Communication Networks, Computer Network Evolution.	1	
1.2 Examples of Protocols and services	1	
1.3 A brief history of internet	1	
1.4 Introduction to Computer Network	2	
1.5 Basic building blocks of a wired communication system.	1	
UNIT - II 2. **Layered Architecture**	**10**	
2.1 Layered Architecture and OSI Model	2	
2.2 OSI unified view of Protocols and Services	2	
2.3 TCP/IP: Architecture and routing examples	1	
2.4 IETF, RFC	1	
2.5 RFC 2151: Internet and TCP/IP tools and utilities	4	
UNIT - III 3. **Socket API and Digital Transmission**	**7**	
3.1 Berkeley Sockets API- I and API-II	2	

3.2 Digital Transmission Fundamentals, RFC 793-TCP	3	
3.3 Digital Transmission using Socket API	2	
UNIT-IV **4. Queuing Theory**	**10**	
4.1 Introduction to Queuing Theory, M/M/1	4	
4.2 Burke's Theorem and Networks of Queues	3	
4.3 M/G/1 and M/D/1 Queue	2	
UNIT-V **5. Protocols**	**7**	
5.1 Packet Multiple Access: The Aloha Protocol	1	
5.2 Routing algorithms and Protocols	2	
5.3 Higher Layer Protocol: TCP/IP,UDP	3	
5.4 ATM	1	

Text Books:

[1] Andrew S. Tanenbaum, David J. Wetherall ,*Computer Networks* (5th Ed) , Pearson,2013, ISBN 9781292024226

[2] Bertsekas, Dimitri, and Robert Gallager. *Data Networks (2nd Edition).* Upper Saddle River, NJ: Prentice Hall, 1991. ISBN: 0132009161.

[3] Peterson and Davie. *Computer Networks (2nd Edition).* San Francisco, CA: Morgan Kaufmann Publishers, 1999. ISBN: 1558605142 .

Reference book:

[1] Stevens. *TCP/IP Illustrated*. Reading, MA: Addison-Wesley Pub. Co., c1994-c1996. ISBN: 0201633469.

[2]Kleinrock, Leonard. *Queueing Systems, Vol 1: Theory*. New York, NY: Wiley J., 1975. ISBN: 0471491101.

> **Additional Resources (Web resources etc.):**
> [1]RFC 2151: Internet and TCP/IP tools and utilities https://tools.ietf.org/html/rfc2151
> [2] RFC 793, "Transmission Control Protocol: DARPA Internet program protocol specification
> https://tools.ietf.org/html/rfc793

Evaluation Methods:

Item	Weightage
Quiz (online)	20
Midterm -Coursera score	30
Final Examination	50

Students need to complete coursera course and obtain course certificate without that they have to appear for Mid Term exam.

Prepared By: Purnendu Karmakar
Last Update: 30/04/2020