Course Title	Communication Networks
Course Code	EE4301
No. of Credit Hrs (Lecture + Tutorial + Lab)	3 (2+0+1)
No. of Contact Hrs (Lecture + Tutorial + Lab)	4 (2+0+2)
Level-Year	7-4
Prerequisite (if any)	EE3307

1) Course Objectives:

To introduce students to the concepts, architectures, protocols and standards of communication networks. Students should develop an understanding of the standard procedures implemented in communication networks along with the purpose of such procedures. Moreover, it provides experimental foundation for the theoretical concepts.

2) Expected Learning Outcomes:

After completing this course, the students should be able to:

1. **Describe and explain** the basics of network architectures, protocols, and standards in wireless and fiber-optic communication systems. **KLO1 [1]**
2. **Analyze** the characteristics of various transmission media used in communication systems. **KLO1 [1]**
3. **Differentiate and evaluate** networking technologies such as frame relay vs. ATM and IPv4 vs. IPv6. **KLO1 [1]**
4. **Design and analyze** communication networks based on switching characteristics and performance requirements. **KLO2 [2]**
5. **Employ and investigate** suitable instruments and equipment in laboratory experiments related to communication networks. **KLO3 [6]**
6. **Communicate** technical results and experimental findings effectively through structured laboratory reports. **KLO8 [3]**

3) Course Contents

1. Introduction to data communications (data communications, networks, the internet, protocols and standards)
2. Network Models (layered tasks, the OSI model, layers in the OSI model, TCP/IP protocol suite, and addressing).
3. Transmission Media (guided media and unguided media: wireless)
4. Switching (circuit-switched networks, datagram (packet) networks, and virtual-circuit networks).
5. Digital subscriber line (xDSL).
6. Fiber optics network (SONET architecture, SONET layers, SONET frames, SONET networks, virtual tributaries)
7. Frame Relay and ATM (frame relay, ATM, and ATM LANs).
8. Internet Protocols (INTERNETWORKING, IPv4, IPv6, and transition from IPv4 TO IPv6)- user datagram protocol (UDP)and TCP.
9. QoS (parameters, requirements, QoS in Frame Relay, and QoS in ATM).

Lab experiments:

1. Introduction (layers, devices and topologies)
2. Practical Implementation of PC-to-PC Communication
3. Practical implementation of Transmission Media (guided media and unguided media)
4. Practical implementation of switching connection
5. Ethernet and Wireless LAN protocols
6. Applying IP in network devices (internet protocols)
7. Implementation of IPv4 and IPv6.
8. Telephone network (DSL implementation)
9. ATM implementation, SONET implementation

4) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

5) Mode of Evaluation: Course Assessment Methods

- Quizzes and assignment
- Major Exams
- Final Exam
- Lab Work

Evaluation

- **Semester Work**
  - Major Exams 30%
  - Quizzes 5%
  - Assignments 5%
  - Lab/Tutorial 20%
- **Final**
  - Paper work 40%

6) Textbook(s):

- Engineering Elements of Electromagnetics, 3rd Edition. Mathew N.O. Sadiku, Oxford University Press.
- Antennas And Wave Propagation, 5th Edition Paperback (2017) John D. Kraus and Ronald J. Marhefka, McGraw Hill.

7) References:

- Telecommunication Transmission Handbook, Roger Freeman, Wiley Inter-sciences, 1991
- Wireless Communications: Principles and Practice by T.S. Rappaport, Prentice Hall
- Behrouz A. Forouzan, Data Communications and Networking, 4th edition, McGraw Hill, 2007