B. Ed. (Information and Communication Technology Education)

1. Course Title:	Communication and Cyber Law	4: Full marks:	75 + 25
2. Course No:	ICTED 323) (V^{th} Paper)	5. Pass marks:	35% + 40%
3. Nature of Course:	Theory and Practical	6. Period per week:	6 + 3

Course Description

The communication system consists of introduction to telephone network, different types of transmission system and media, concepts of multiplexing and multiple access techniques, principles of pulse code modulation, and different types of switching techniques and systems. The course in networking lays out the principles of basics of networking, understanding of network topologies and network architecture, study of network software and reference model. It also deals with physical layers and its design issues, data link layers, transmission control protocol/ internet protocol reference model, network layer and internet layer, principles of network server and protocols, network management and security, and study of information and communication technology and cyber law with respect to Nepal's context.

General Objectives

(a) to provide students with broad knowledge of principles of transmission, switching, signaling and networking aspects of modern telecommunication systems.
(b) to develop meaningful understanding of different kinds of networking topologies and their structure and design.
(c) to explain telephone system, electronic email, data flows, networking protocols, and organization around ISO-OSI seven-layer architecture, with review of each layer.

S.N	Objectives	Contents	Periods	Teaching Strategies	References	Evaluation
1.	-Understand basic of telephone network and its application.	**Introduction** Public-switched telephone network (PSTN), network topology, central office switch, subscriber telephone, subscriber loop, telephone conversation, hierarchical networks	5	-Lecture -Discussion	Stallings Chap 1, 2	-Short question -Multiple Choice

2.	-Identify different data transmission model. -Understand different types of transmission media.	**Transmission** Comparison between analog and digital transmission, transmission media (twisted pair, coaxial cable, optical fiber, radio and microwave), transmission impairments (distortion, noise, interference, crosstalk, echo, singing, jitter)	7	-Lecture -Discussion -Group work	Tanenbaum Chap 2	-Short question -Multiple Choice
3.	-Understand multiplexing techniques. - Classify different types of multiple access techniques.	**Multiplexing and multiple access techniques** Multiplexing and concentration, space-division multiplexing (SDM), time-division multiplexing (TDM), frequency division multiplexing (FDM), wavelength-division multiplexing (WDM), frequency division multiple access (FDMA), time-division multiple access (TDMA), code-division multiple access (CDMA), space-division multiple access (SDMA), ALOHA, slotted-ALOHA, CSMA/CD	7	-Lecture -Discussion -Group work	Stallings Chap 8, 9	-Short question -Long question -Multiple Choice
4.	-Identify the current digital communication system. -Understand the basic principle and application of pulse code modulation.	**Pulse code modulation (PCM)** PCM generation, companding in PCM, μ-law and A-law, PCM transmission format (T1, and E1 lines), frame and multiframe, frame and multiframe alignment strategy, line codes (AMI, HDB3 and B8ZS), higher order PCM, plesiochronous digital hierarchy (PDH), synchronous digital hierarchy (SDH) and SONET	11	-Lecture -Discussion -Group work	Stallings Chap 5	-Short question -Long question -Multiple Choice

5.	-Explain data sending techniques. -Identify different types of switching process and techniques.	**Switching techniques and system** Message switching, packet switching, circuit switching, manual switching, electro mechanical switching, electronic switching , stored control program, space-division switching, time-division switching, space-time division switching, multiple stage switching, digital cross connect, private branch exchange	11	-Lecture -Discussion -Group work	Stalling Chap 10,12	-Short question -Long question -Multiple Choice
6.	-Identify different techniques in the networking system.	**Background Study** Introduction and necessity of computer Networking; Different types of multiplexing: Simplex, Duplex, Half Duplex	3	-Lecture -Discussion -Group work	Tanenbaum Chap 1	-Short question -Multiple Choice
7.	-Understand different types of network topologies and their applications.	**Introduction to Network Topologies** Definition, use and prospect of LAN; Types of networking: LAN, WAN, MAN, Extra-Net, Intra-Net and Inter-Net	7	-Lecture -Discussion -Group work	Tanenbaum Chap 1	-Short question -Multiple choice
8.	-Understand different types of network architecture and their applications.	**Network Architecture** Star, Clustered Star, Bus, Ring: Logical and Physical, Client Server Network Model; Peer-to-peer Network architecture model; Wireless LAN	7	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 1	-Short question -Multiple choice
9.	-Explain network software and reference model.	**Reference Model** Network software, Protocol Hierarchy and its need, Interfaces and Services; Introduction of OSI Reference Model	13	-Lecture -Discussion -Group work	Tanenbaum Chap 1	-Short Question -Long question -Multiple Choice

10.	-Justify the physical layer in the networking system.	**Physical layers and its Design issues** Twisted Pair Cable; Co-axial Cable; Base-band Cable; Broad-band Cable; Fiber Optics; Wireless Networking; Physical Layer Devices (Hub, Repeaters); Introduction of Frame Relay, ATM, ISDN, PSTN and X.25.	11	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 2	-Short question -Long question -Multiple choice
11.	-Understand the process of data linking. -Explain different protocols.	**Data Link Layers** Services and Data Link Layer devices (Switch, Bridge); Framing, Flow Control and Error Control; Elementary Data link Protocols; Sliding Window Protocols; HDLC, SLIP and PPP; Media Access Control Layer (Carrier Sense Multiple Access/Collision Detection)	12	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 3	-Short Question -Long question -Multiple Choice
12.	-Understand the transmission control protocol and internet protocol and their interdependency.	**TCP / IP Reference Model** Introduction of TCP / IP Model; Comparison with OSI Reference Model; IPV4 Frame Format; IP Addresses and Classes; Subnet and Subnet mask; Introduction of IPV6	12	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 4, 5	-Short question -Long question -Multiple choice
13.	-Identify different types of algorithms in the case of network layer and internet layer. -Explain routing system and its importance.	**Network Layer and Internet Layer** Network Layer and Design Issues; Virtual Circuit and Data grams Subject; Introduction of Routing- Shortest path Routing Algorithm, Flow Based Routing Algorithm, Distance Vector Routing Algorithm, Spanning Tree Routing; Congestion Control; Traffic Shaping and Leaky Bucket Algorithm	12	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 5, 6	-Short question -Long question -Multiple choice

14.	-Understand different types of network servers. -Identify and application of different protocols.	**Network Severs and Protocols** HTTP, DHCP; SMTP, DNS, PROXY, FTP, POP and IMAP; Examples of Clients, Servers Tools and Virtual private Networks	6	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 7	-Short question -Long question -Multiple choice
15.	-Develop understanding of the importance of network management. -Explain the basic principle and perform the application of cryptology.	**Network Management and Security** Introduction to Network management, Internet Network-Management framework (SMI & HIB) & SNMP protocol; Data encryption, Data Encryption standard; Principles of Cryptography (Symmetric Key & public key Encryption), Integrity & firewalls	6	-Lecture -Practical -Discussion -Group work	Tanenbaum Chap 7	-Short question -Long question -Multiple Choice
16.	-Explain information technology. -Discuss the cyber law in the context of Nepal.	**Information Communication Technology and Cyber Law** Social Impact of the ICT, Digital Divide, Computer Ethics, Intellectual Properties Right, Privacy, Anonymity, Computer Crime, Concept of Cyber Law, Area of Cyber Law, Cyber Law in Nepal, IT Policy in Nepal	20	-Lecture -Discussion -Group work	Internet, Books, Laws of Nepal Government.	Short question -Long question -Multiple Choice

Laboratory:

1. Setting up Client /Server Architecture system using Microsoft product and Linux
2. Understanding Route interface and Basic Router using Route simulator.
3. Understanding the socket Interface and window Socket API.

Text book:

1 W. Stallings, "Data Communication and Computer Networks", Seventh Edition, Prentice-Hall of India Limited, 2004.
2 Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Prentice-Hall of India Limited, 2004.

Reference Books:

1. Uyless D. Black, "Data Communications and Distributed Networks", Third Edition, Prentice-Hall of India Limited, 2002.
2. J. Bellamy, Digital Telephony
3. B. Carson, Communication Systems.
4. J. E. Flood, Telecommunication switching, networks and traffic
5. Computer networking by James F. kurose, keith W. Ross.
6. Internet programming by KNJ Jamsa and ken cope.
7. Computer networking by RS Rajesh, KS Easwarakumar, R Balasubramaian.
8. Unit Network Programming by Stevens W.R- Vol.I and II.
9. TCP/IP Protocol by Behrouz A Foruldzan.
10. LAN by Gerd . E. keiser.