COMMUNICATION ENGLISH [SH] - SYLLABUS
COMMUNICATION ENGLISH [SH] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : II
Practical : 2

Course Objectives
To make the students capable of producing professional writings such as research articles, technical proposals, reports and project work.
To familiarize the students with the native speakers' pronunciation with the use of audio-visual aids.

Unit I: Reading (15 hours)
1. Intensive Reading 8 hours
1.1. Comprehension
1.2. Note-taking
1.3. Summary writing
1.4. Contextual questions based on facts and imagination
1.5. Interpreting text

2. Extensive Reading 5 hours
2.1. Title/Topic Speculation
2.2. Finding theme
2.3. Sketching character

3. Contextual Grammar 2 hours
3.1. Sequence of tense
3.2. Voice
3.3. Subject-Verb agreement
3.4. Conditional Sentences
3.5. Preposition

Unit II: Writing (30 hours)
1. Introduction to technical writing process 2 hours
1.1. Composing and editing strategies
1.2. MLA and APA comparison

2. Writing notices with agenda and minutes 2 hours
2.1. Introduction
2.2. Purpose
2.3. Process

3. Writing Proposal 6 hours
3.1. Introduction
3.2. Parts of the proposal

3.2.1. Title page
3.2.2. Abstract/Summary
3.2.3. Statement of Problem
3.2.4. Rationale
3.2.5. Objectives
3.2.6. Procedure/Methodology
3.2.7. Cost estimate or Budget
3.2.8. Time management/Schedule
3.2.9. Summary
3.2.10. Conclusion
3.2.11. Evaluation or follow-up
3.2.12. Works cited

4. Reports
4.1. Informal Reports 6 hours
4.1.1. Memo Report
4.1.1.1. Introduction
4.1.1.2. Parts

4.1.2. Letter Report
4.1.2.1. Introduction
4.1.2.2. Parts

4.2. Project/Field Report 3 hours
4.2.1. Introduction
4.2.2. Parts

4.3. Formal report 9 hours
4.3.1. Introduction
4.3.2. Types of Formal Reports
4.3.2.1. Progress Report
4.3.2.2. Feasibility Report
4.3.2.3. Empirical/ Research Report
4.3.2.4. Technical Report

4.3.3. Parts and Components of Formal Report
4.3.3.1. Preliminary section
4.3.3.1.1. Cover page
4.3.3.1.2. Letter of transmittal/Preface
4.3.3.1.3. Title page
4.3.3.1.4. Acknowledgements
4.3.3.1.5. Table of Contents
4.3.3.1.6. List of figures and tables
4.3.3.1.7. Abstract/Executive summary

4.3.3.2. Main Section
4.3.3.2.1. Introduction
4.3.3.2.2. Discussion/Body

4.3.3.2.3. Summary/Conclusion
4.3.3.2.4. Recommendations

4.3.3.3. Documentation
4.3.3.3.1. Notes (Contextual/foot notes)
4.3.3.3.2. Bibliography
4.3.3.3.3. Appendix

5. Writing Research Articles 2 hours
5.1. Introduction
5.2. Procedures

References

1. Adhikari, Usha : Yadv, Rajkumar : Shrestha, Rup Narayan ; (2000) Communicative Skills in english,Research Training Unit, IOE, Pulchowk Campus
2. Khanal, Ramnath, (2008) Need-based Language Teaching (Analysis in Relation to Teaching of English for Profession Oriented Learners) Kathmandu : D, Khanal.
3. Konar, Nira (2010), Communication Skills for Professional PHI Learning Private Limited, New Delhi.
4. Kumar, Ranjit (2006), Research Methodology, Pearson Education.
5. Laxminarayan, K.R (2001), English for Technical Communication.
Chennai; Scitech publications (India) Pvt. Ltd.
6. Mishra, Sunita et. al. (2004), Communication Skills for Engineers, Pearson Education First Indian print.
7. Prasad, P. et. al (2007), The functional Aspects of Communication Skills S.K. Kataria & sons.
8. Rutherfoord, Andrea J. Ph.D (2001), Basic Communication Skills for Technology, Pearson Education Asia.
9. Rizvi, M. Ashraf (2008), Effective Technical Communication. Tata Mc Graw Hill.
10. Reinking A James et. al (1999), Strategies for Successful Writing: A rhetoric, research guide, reader and handbook, Prentice Hall Upper Saddle River, New Jersey.
11. Sharma R.C. et al. (2009), Business Correspondence and Report Writing: A Practical Approach to Business and Technical communication. Tata Mc Graw Hill.
12. Sharma, Sangeeta et. al (2010) Communication skills for Engineers and Scientists, PHI Learning Private Limited, New Delhi.
13. Taylor, Shirley et. al. (2009), Model Business letters, E-mails & other Business documents, Pearson Education.

PROBABILITY AND STATISTICS - SYLLABUS

PROBABILITY AND STATISTICS - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 0

Course Objective:
To provide the students with particle knowledge of the principles and concept of probability and statistics and their application in engineering field.

1. Descriptive statistics and Basic probability (6 hours)
1.1. Introduction to statistics and its importance in engineering
1.2. Describing data with graphs (bar, pie, line diagram, box plot)
1.3. Describing data with numerical measure(Measuring center, Measuring variability)
1.4. Basic probability, additive Law, Multiplicative law, Baye's theorem.

2. Discrete Probability Distributions (6 hours)
2.1. Discrete random variable
2.2. Binomial Probability distribution
2.3. Negative Binomial distribution
2.4. Poison distribution
2.5. Hyper geometric distribution

3. Continuous Probability Distributions (6 hours)
3.1. Continuous random variable and probability densities
3.2. Normal distribution
3.3. Gama distribution
3.4. Chi square distribution

4. Sampling Distribution (5 hours)
4.1. Population and sample
4.2. Central limit theorem
4.3. Sampling distribution of sample mean
4.4. Sampling distribution of sampling proportion

5. Correlation and Regression (6 hours)
5.1. Least square method
5.2. An analysis of variance of Linear Regression model
5.3. Inference concerning Least square method
5.4. Multiple correlation and regression

6. Inference Concerning Mean (6 hours)
6.1. Point estimation and interval estimation
6.2. Test of Hypothesis
6.3. Hypothesis test concerning One mean
6.4. Hypothesis test concerning two mean

6.5. One way ANOVA

7. Inference concerning Proportion (6 hours)
7.1. Estimation of Proportions
7.2. Hypothesis concerning one proportion
7.3. Hypothesis concerning two proportion
7.4. Chi square test of Independence

8. Application of computer on statistical data computing (4 hours)
8.1. Application of computer in computing statistical problem. eq scientific calculator, EXCEL, SPSS , Matlab etc

References:
1. Richard A. Johnson, "Probability and Statistics for Engineers 7th edition", Miller and Freund's publication
2. Jay L. Devore, " Probability and Statistics for Engineering and the Sciences" , Brooks/Cole publishing Company, Monterey, California,1982
3. Richard I. Levin, David S Rubin, " Statistics For Management", Prentice Hall publication
4. Mendenhall Beaver Beaver, " Introduction Probability and statistics 12th edition ", Thomson Brooks/Cole

Evaluation scheme:
The questions will cover the entire chapter of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Mark distribution *
1	6	12
2	6	10
3	6	10
4	5	10
5	6	10
6	6	10
7	6	10
8	4	8
Total	**45**	**80**

*There may be minor deviation in marks distribution.

COMPUTER ORGANIZATION AND ARCHITECTURE [CT] - SYLLABUS

COMPUTER ORGANIZATION AND ARCHITECTURE [CT] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 1.5

Course objectives:
To provide the organization, architecture and designing concept of computer system including processor architecture, computer arithmetic, memory system, I/O organization and multiprocessors.

1. Introduction (3 hours)
1.1. Computer organization and architecture
1.2. Structure and function
1.3. Designing for performance
1.4. Computer components
1.5. Computer Function
1.6. Interconnection structures
1.7. Bus interconnection
1.8. PCI

2. Central processing Unit (10 hours)
2.1. CPU Structure and Function
2.2. Arithmetic and logic Unit
2.3. Instruction formats
2.4. Addressing modes
2.5. Data transfer and manipulation
2.6. RISC and CISC
2.7. 64-Bit Processor

3. Control Unit (6 hours)
3.1. Control Memory
3.2. Addressing sequencing
3.3. Computer configuration
3.4. Microinstruction Format
3.5. Symbolic Microinstructions
3.6. Symbolic Micro program
3.7. Control Unit Operation
3.8. Design of control unit

4. Pipeline and Vector processing (5 hours)
4.1. Pipelining
4.2. Parallel processing
4.3. Arithmetic Pipeline
4.4. Instruction Pipeline
4.5. RISC pipeline
4.6. Vector processing
4.7. Array processing

5. Computer Arithmetic (8 hours)
5.1. Addition algorithm
5.2. Subtraction algorithm
5.3. Multiplication algorithm
5.4. Division algorithms
5.5. Logical operation

6. Memory system (5 hours)
6.1. Microcomputer Memory
6.2. Characteristics of memory systems
6.3. The Memory Hierarchy
6.4. Internal and External memory
6.5. Cache memory principles
6.6. Elements of Cache design
6.6.1. Cache size
6.6.2. Mapping function
6.6.3. Replacement algorithm
6.6.4. Write policy
6.6.5. Number of caches

7. Input-Output organization (6 hours)
7.1. Peripheral devices
7.2. I/O modules
7.3. Input-output interface
7.4. Modes of transfer
7.4.1. Programmed I/O
7.4.2. Interrupt-driven I/O
7.4.3. Direct Memory access
7.5. I/O processor
7.6. Data Communication processor

8. Multiprocessors (2 hours)
8.1. Characteristics of multiprocessors
8.2. Interconnection Structures
8.3. Interprocessor Communication and synchronization

Practical:
1. Add of two unsigned Integer binary number
2. Multiplication of two unsigned Integer Binary numbers by Partial-Product Method

3. Subtraction of two unsigned integer binary number
4. Division using Restoring
5. Division using non- restoring methods
6. To simulate a direct mapping cache

References:
1. M. Morris Mano: Computer System Architecture, Latest Edition
2. William Stalling: Computer organization and architecture, Latest Edition
3. John P. Hayes: Computer Architecture and Organization, Latest Edition
4. V.P. Heuring, H.F. Jordan: Computer System design and architecture, Latest Edition
5. S. Shakya: Lab Manual on Computer Architecture and design

Evaluation Scheme:
The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks distribution*
1	3	6
2	10	18
3	6	10
4	5	10
5	8	14
6	5	8
7	6	10
8	2	4
Total	45	80

*There may be minor variation in marks distribution.

SOFTWARE ENGINEERING [CT] - SYLLABUS

SOFTWARE ENGINEERING [CT] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 1.5
Course Objectives:
This course provides a systematic approach towards planning, development, implementation and maintenance of system, also help developing software projects.

1. Software Process and requirements (12 hours)
1.1. Software crisis
1.2. Software characteristics
1.3. Software quality attributes
1.4. Software process model
1.5. Process iteration
1.6. process activities
1.7. Computer-aided software engineering
1.8. Functional and non –functional requirements
1.9. User requirements
1.10. System requirement
1.11. Interface specification
1.12. The software requirements documents
1.13. Feasibility study
1.14. Requirements elicitation and analysis
1.15. Requirements validation and management

2. System models (3 hours)
2.1. Context models
2.2. Behavioural models
2.3. Data and object models
2.4. Structured methods

3. Architectural design (6 hours)
3.1. Architectural design decisions
3.2. System organization
3.3. Modular decomposition styles
3.4. Control styles

3.5. Reference architectures
3.6. Multiprocessor architecture
3.7. Client –server architectures
3.8. Distributed object architectures
3.9. Inter-organizational distributed computing

4. Real –time software design (3 hours)
4.1. System design
4.2. Real-time operating systems
4.3. Monitoring and control systems
4.4. Data acquisition systems

5. Software Reuse (3 hours)
5.1. The reuse landscape
5.2. Design patterns
5.3. Generator –based reuse
5.4. Application frameworks
5.5. 10.5 Application system reuse

6. Component-based software engineering (2 hours)
6.1. Components and components models
6.2. The CBSE process
6.3. Component composition

7. Verification and validation (3 hours)
7.1. Planning verification and validation
7.2. Software inspections
7.3. Verification and formal methods
7.4. Critical System verification and validation

8. Software Testing and cost Estimation (4 hours)
8.1. System testing
8.2. Component testing
8.3. Test case design
8.4. Test automation
8.5. Metrics for testing
8.6. Software productivity
8.7. Estimation techniques
8.8. Algorithmic cost modeling
8.9. Project duration and staffing

9. Quality management (5 hours)
9.1. Quality concepts
9.2. Software quality assurance
9.3. Software reviews
9.4. Formal technical reviews
9.5. Formal approaches to SQA
9.6. Statistical software quality assurance

9.7. Software reliability
9.8. A framework for software metrics
9.9. Matrices for analysis and design model
9.10. ISO standards
9.11. CMMI
9.12. SQA plan
9.13. Software certification

10. Configuration Management (2 hours)
10.1. Configuration management planning
10.2. Change management
10.3. Version and release management
10.4. System building
10.5. CASE tools for configuration management

Practical
The laboratory exercises shall include projects on requirements, analysis and designing of software system. Choice of project depend upon teacher and student, case studies shall be included too. Guest lecture from software industry in the practical session.

References:
1. Ian Sommerville, Software Engineering , Latest edition
2. Roger S. Pressman, Software Engineering –A Practitioner's Approach, Latest edition
3. Pankaj Jalote, Software Engineering-A precise approach, Latest edition
4. Rajib Mall, Fundamental of Software Engineering, Latest edition

Evaluation Scheme:
The questions will cover all the chapters in syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks distribution*
1	12	20
2	3	5
3	6	10
4	3	5
5	3	5
6	2	3
7	5	10
8	4	8
9	5	10
10	2	4
Total	45	80

*There may be minor deviation in marks distribution

COMPUTER GRAPHICS [EX] - SYLLABUS
COMPUTER GRAPHICS [EX] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 1.5

Course Objectives:
To familiarize with graphics hardware, line and curve drawing techniques, techniques for representing and manipulating geometric objects, illumination and lighting models. .

1. Introduction and application [2 hours]
History of computer graphics, Applications of computer graphics, Hardware: Raster-Scan Displays, Vector Displays, Hard copy devices, Input Hardwares, Display Architectures, Applications in various fields like medicine, engineering, art, uses in virtual realism.

2. Scan-Conversion [6 hours]
2.1. Scan-Converting A Point
2.2. Scan-Converting A Straight Line: DDA Line Algorithm, Bresenham's Line Algorithm
2.3. Scan-Converting a Circle and an Ellipse: Mid-Point Circle and Ellipse Algorithm

3. Two –Dimensional Transformations [6 hours]
3.1. Two –dimensional translation, rotation, scaling, reflection, shear transforms
3.2. Two-dimensional composite transformation
3.3. Two-dimensional viewing pipeline, world to screen viewing transformations and clipping (Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping)

4. Three-Dimensional Graphics [6 hours]
4.1. Three –dimensional translation, rotation, scaling, reflection, shear transforms
4.2. Three-dimensional composite transformation
4.3. Three-dimensional viewing pipeline, world to screen viewing transformation, projection concepts (orthographic, parallel, perspective projections)

5. Curve Modeling [4 hours]

Introduction to Parametric cubic Curves, Splines, Bezier curves
6. Surface modeling [4 hours]
Polygon surface, vertex table, edge table, polygon table, surface normal and spatial orientation of surfaces
7. Visible Surface Determination [6 hours]
7.1. Image Space and Object Space techniques
7.2. Back Face Detection, Z-Buffer, A-Buffer, Scan-Line method

8. Illumination and Surface Rendering methods [8 hours]
8.1. Algorithms to simulate ambient, diffuse and specular reflections
8.2. Constant , Gouraud and phong shading models

9. Introduction to Open GL [3 hours]
Introduction to OpenGl, callback functions, Color commands, drawing pixels, lines, and polygons using OpenGL, Viewing, Lighting.

Practical:
There shall be 5 to 6 lab exercise including following concepts:
1. DDA Line Algorithm
2. Bresenham's Line algorithm
3. Mid Point Circle Algorithm
4. Mid Point Ellipse Algorithm
5. Lab on 2-D Transformations
6. Basic Drawing Techniques in OpenGL

Text Book:
Donald Hearn and M. Pauline Baker, "Computer Graphics C version (2nd edition)"

Reference
1. Donald D. Hearn and M. Pauline Baker, "Computer Graphics with OpenGL (3rd Edition)"
2. Foley, Van Dam, Feiner, Hughes "Computer Graphics Principles and Practice (Second Edition in C")

Evaluation Scheme:
The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Units	Hrs	Mark Distribution
1	2	4
2	6	10
3	6	10
4	6	10
5	4	8
6	4	8
7	6	10
8	8	14
9	3	6
Total	**45**	**80**

*There may be minor variation in marks distribution.

NSTRUMENTATION II [EX] - SYLLABUS
INSTRUMENTATION II [EX] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 3/2
Course Objective:
Continuation of INSTRUMENTATION I with emphasis on advance system design and case studies.
To introduce and apply the knowledge of microprocessor, A/D, D/A converter to design Instrumentation system.
To provide the concept on interfacing with microprocessor based system and circuit design techniques.

1. Microprocessor Based Instrumentation System (4 hours)
1.1. Basic Features of Microprocessor Based System
1.2. Open Loop and Closed Loop Microprocessor Based System
1.3. Benefits of Microprocessor Based System
1.4. Microcomputer on Instrumentation Design
1.5. Interfacing With Microprocessor
1.5.1. PC Interfacing Techniques
1.5.2. Review of Address Decoding
1.5.3. Memory Interfacing
1.5.4. Programmed I/O, Interrupt Driven I/O and Direct Memory Access (DMA)

2. Parallel Interfacing With Microprocessor Based System (4 hours)
2.1. Methods of Parallel Data Transfer : Simple Input and Output, Strobe I/O, Single Handshake I/O, & Double Handshake I/O
2.2. 8255 as General Purpose Programmable I/O Device and its interfacing examples
2.3. Parallel Interfacing with ISA and PCI bus

3. Serial Interfacing With Microprocessor Based System (6 hours)
3.1. Advantages of Serial Data Transfer Over Parallel
3.2. Synchronous and Asynchronous Data Transfer
3.3. Errors in Serial Data Transfer
3.4. Simplex, Half Duplex and Full Duplex Data Communication
3.5. Parity and Baud Rates
3.6. Introduction Serial Standards RS232, RS423, RS422
3.7. Universal Serial Bus
3.7.1. The Standards: - USB 1.1 and USB 2.0
3.7.2. Signals, Throughput & Protocol

3.7.3. Devices, Hosts And On-The-Go
3.7.4. Interface Chips:- USB Device And USB Host

4. Interfacing A/D And D/A Converters (4 hours)
4.1. Introduction
4.2. General Terms Involved in A/D and D/A Converters
4.3. Examples of A/D and D/A Interfacing
4.4. Selection of A/D and D/A Converters Based on Design Requirements

5. Data Acquisition And Transmission (5 hours)
5.1. Analog and Digital Transmission
5.2. Transmission Schemes
5.2.1. Fiber Optics
5.2.2. Satellite
5.2.3. Bluetooth Devices
5.3. Data Acquisition System
5.3.1. Data Loggers
5.3.2. Data Archiving and Storage

6. Grounding And Shielding (3 hours)
6.1. Outline for Grounding and Shielding
6.2. Noise, Noise Coupling Mechanism and Prevention
6.3. Single Point Grounding and Ground Loop
6.4. Filtering and Smoothing
6.5. Decoupling Capacitors and Ferrite Beads
6.6. Line Filters, Isolators and Transient Suppressors
6.7. Different Kinds of Shielding Mechanism
6.8. Protecting Against Electrostatic Discharge
6.9. General Rules For Design

7. Circuit Design (3 hours)
7.1. Converting Requirements into Design
7.2. Reliability and Fault Tolerance
7.3. High Speed Design
7.3.1. Bandwidth, Decoupling, Ground Bounce, Crosstalk, Impedance Matching, and Timing
7.4. Low Power Design
7.5. Reset and Power Failure Detection and interface Unit

8. Circuit Layout (3 hours)
8.1. Circuits Boards and PCBs
8.2. Component Placement
8.3. Routing Signal Tracks
8.3.1. Trace Density, Common Impedance, Distribution of Signals and Return, Transmission Line Concerns, Trace Impedance and Matching, and Avoiding Crosstalk.
8.4. Ground ,Returns and Shields
8.5. Cables and Connectors
8.6. Testing and Maintenance

9. Software For Instrumentation And Control Applications (4 hours)
9.1. Types of Software, Selection and Purchase
9.2. Software Models and Their Limitations
9.3. Software Reliability
9.4. Fault Tolerance
9.5. Software Bugs and Testing
9.6. Good Programming Practice
9.7. User Interface
9.8. Embedded and Real Time Software

10. Case Study (9 hours)
Examples chosen from local industrial situations with particular attention paid to the basic measurement requirements, accuracy, and specific hardware employed environmental conditions under which the instruments must operate, signal processing and transmission, output devices:

a) Instrumentation for a power station including all electrical and non-electrical parameters.
b) Instrumentation for a wire and cable manufacturing and bottling plant.
c) Instrumentation for a beverage manufacturing and bottling plant.
d) Instrumentation for a complete textile plant; for example, a cotton mill from raw cotton through to finished dyed fabric.
e) Instrumentation for a process; for example, an oil seed processing plant from raw seeds through to packaged edible oil product.
f) Instruments required for a biomedical application such as a medical clinic or hospital.
g) Other industries can be selected with the consent of the Subject teacher.

Practical:
The laboratory exercises deal interfacing techniques using microprocessor or microcontrollers. There will be about six lab sessions which should cover at least following:
1. Simple and Handshake data transfer using PPI.
2. Basic I/O device interfacing like keyboard, seven segments, motors etc
3. Analog to Digital interfacing
4. Digital to Analog interfacing
5. Design exercise (small group project)

Study in detail the instrumentation requirements of a particular proposed or existing industrial plant and design an instrumentation and data collection system for that particular industrial plant. The final report should present the instrumentation requirements in terms of engineering specifications, the hardware solution suggested, a listing of the particular devices chosen to satisfy the requirements, appropriate system flow diagrams, wiring diagrams, etc. to show how the system would be connected and operated.

References:
D. V. Hall, “Microprocessor and Interfacing, Programming and Hardware” Revised 2nd Edition 2006, Tata McGraw Hill
K.R. Fowler, “Electronic Instrument Design: Architecting for the Life Cycle”, Oxford University Press, Inc. 1996
Ramesh S. Gaonkar, “Microprocessor Architecture, Programming and Application with 8085”, 5th Edition 2002, Prentice Hall

A.K. Ray & K.M. Bhurchandi, “Advanced Microprocessors And Peripherals”, 2nd Edition 2006, Tata McGraw Hill
E.O. Duebelin, “Measurement System Application And Design”,5th Edition, Tata McGraw Hills
John Hyde, "USB Design By Example", Intel Press
PCI bus, USB, 8255,Bluetooth datasheets
D. M. Consodine, "Process Instruments and Controls Handbook", 3rd Edition, McGraw-Hill,New York, 1985.
S. Wolf and R. F. Smith, "Student Reference Manual for Electronic Instrumentation Laboratories", Prentice Hall, Englewood Cliffs, New Jersey, 1990.
S. E. Derenzo, "Interfacing: A Laboratory Approach Using the Microcomputer for Instrumentation, Data Analysis, and Control", Prentice Hall, Englewood Cliffs, New Jersey, 1990.

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below

Unit	Hour	Marks Distribution
1	4	8
2	4	8
3	6	10
4	4	8
5	5	8
6	3	6
7	3	6
8	3	6
9	4	8
10	9	12
Total	45	80

* There can be slight deviation in marks allocation.

DATA COMMUNICATION [CT] - SYLLABUS
DATA COMMUNICATION [CT] - SYLLABUS

Lecture : 3 Year : III
Tutorial : 1 Part : I
Practical : 3/2

Course Objective:
The objective of the course is to familiarize student with the concept of data communication, communication signals and their characteristics, transmission media and their characteristics, basics of multiplexing and switching.

1. Introduction [4 hours]
1.1. Data and Signal
1.2. Analog and Digital Signal
1.3. Data Representation
1.4. Analog and Digital Data Communication System
1.5. Transmission Impairments (Attenuation, Noise, Distortion)

2. Signals and Systems [4 hours]
2.1. Signal and Classification of Signals: Periodic and Non-periodic Signals, Deterministic and Random Signals, Energy and Power Signals, Continuous Time and Discrete Time Signals
2.2. System and Basic Properties of Systems: System with and without memory, Linearity, Time Invariance, Invertibility, Casuality, Stability

3. Signal Analysis [6 hours]
3.1. Unit Impulse Function and Unit Step Function
3.2. LTI System and Impulse Response
3.3. Fourier Series Representation of Continuous Time Signal
3.4. Fourier Transform of Continuous Time Signal

3.5. Spectral Analysis of a Signal, Signal Bandwidth

4. Transmission Media [4 hours]
4.1. Electromagnetic Spectrum for Communication and Type of Propagation
4.2. Guided Transmission Media: Copper Media (Twisted pair and Co-axial) and Fiber Optics
4.3. Unguided Communication Bands and Antennas
4.4. Unguided Transmission Media: Terrestrial Microwaves, Satellite Communication and Cellular System
4.5. Data Rate Limits: Nyquist Bit Rate for Noiseless Channel, Shannon Capacity for Noisy Channel
4.6. Performance of Channel: Bandwidth, Throughput, Latency, Jitter, Bit Error Rate (BER)

5. Data Encoding and Modulation [10 hours]
5.1. Baseband Communication (Analog/Digital)
5.2. Data Encoding and Modulation
5.3. Types of Analog Modulation: Amplitude Modulation, Frequency Modulation and Phase Modulation
5.4. Pulse Modulation System: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM)
5.5. Encoding Analog Data as Digital Signal: Pulse Code Modulation (PCM)
5.6. Encoding Digital Data as Digital Signals
5.7. Line Coding Schemes: NRZ, RZ, Manchester, AMI
5.8. Block Coding, Scrambling
5.9. Digital Modulation: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Quadrature Amplitude Modulation (QAM)

6. Multiplexing and Spreading [6 hours]
6.1. Multiplexing and Application
6.2. Frequency Division Multiplexing (FDM), Wavelength-Division Multiplexing (WDM)
6.3. Time Division Multiplexing (TDM)
6.4. Spread Spectrum
6.5. Code-Division Multiple Access (CDMA)

7. Switching [3 hours]
7.1. Switching and Application
7.2. Circuit Switching and Packet Switching
7.3. Datagram Switching and Virtual Circuit Switching
7.4. X.25, Frame Relay, ATM

8. Information Theory and Coding [8 hours]
8.1. Introduction to Information Theory, Average Information
8.2. Source Coding – Huffman Coding
8.3. Error Detection and Correction Codes
8.4. Hamming Distance
8.5. Linear Block Coding
8.6. Cyclic Codes, CRC
8.7. Convolution Codes
Practical:
1. Signal analysis using MATLAB
2. Bandwidth analysis of different signals using spectrum analyzer
3. Analog Modulation Generation and Reconstruction
4. Pulse Modulation Generation and Reconstruction

5. Conversion of given binary sequence into different line coding
6. Digital Modulation (ASK, FSK, PSK) Generation and Reconstruction

References:
1. Data and Computer Communications, Eight Edition, William Stallings
2. Data Communications and Networking, Fourth Edition, Behrouz A Forouzan
3. Signals and Systems, A. V. Oppenheim, Latest Edition
4. Computer Networks, A. S. Tanenbaum, Latest Edition

Evaluation Scheme:
The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Unit	Hour	Marks Distribution
1	4	8
2	4	8
3	6	10
4	4	8
5	10	18
6	6	10
7	3	5
8	8	15
Total	45	80

*There may be minor variation in marks distribution.