COMMUNICATION ENGLISH

Unit I: Reading (15 hours)

1. Intensive Reading (8 hours) **-----[5]**
    - Comprehension
    - Note-taking
    - Summary writing
    - Contextual questions based on facts and imagination
    - Interpreting text
2. Extensive Reading (5 hours) **-----[5]**
    - Title/Topic Speculation
    - Finding theme
    - Sketching character
3. Contextual Grammer (2 hours) **-----[5]**
    - Sequence of tense
    - Voice
    - Subject-Verb agreement
    - Conditional Sentences
    - Preposition

Unit II: Writing (30 hours)

1. Introduction to technical writing process (2 hours)
    - Composing and editing strategies **-----[5]**
    - MLA and APA comparison **-----[4]**
2. Writing notices with agenda and minutes (2 hours) **-----[5]**
    - Introduction
    - Purpose
    - Process
3. Writing Proposal (6 hours) **-----[8]**
    - Introduction
    - Parts of the proposal
        - Title page
        - Abstract/Summary
        - Statement of Problem
        - Rationale
        - Objectives
        - Procedure/Methodology
        - Cost estimate or Budget
        - Time management/Schedule
        - Summary

- Conclusion
- Evaluation or follow-up
- Works cited

4. Reports
    - Informal Reports (6 hours)
        - Memo Report
            - Introduction
            - Parts
        - Letter Report Introduction Parts
    - Project/Field Report (3 hours) **-----[8]**
        - Introduction
        - Parts
    - Formal Reports (9 hours) **-----[10]**
        - Introduction
        - Types of Formal Reports
            - Progress Report
            - Feasibility Report
            - Empirical/ Research Report
            - Technical Report
        - Parts and Components of Formal Report
            - Preliminary section
                - Cover page
                - Letter of transmittal/Preface
                - Title page
                - Acknowledgements
                - Table of Contents
                - List of figures and tables
                - Abstract/Executive summary
            - Main Section
                - Introduction
                - Discussion/Body
                - Summary/Conclusion
                - Recommendations
            - Documentation
                - Notes (Contextual/foot notes)
                - Bibliography
                - Appendix

5. Writing Research Articles (2 hours) **-----[10]**
    - Introduction
    - Procedures

[Reading Passage -----[15]]

Question Pattern

1. Edit the text .....**[5 marks]**
2. Read and interpret the text .....**[5 marks]**
3. Notes and summary .....**[10 marks]**
4. Passages: Section –12 to Section –17 … 1.Q

   Section –12 to Section –17 … 1.Q

   Choose any 2 from 3 .....**[10 marks total]**
5. Grammer .....**[5 marks]**
6. Citations [MLA and APA] .....**[4 marks]**
7. Notice with agenda and/or minute .....**[5 marks]**
8. Report in letter format (Monthly progress report) .....**[6 marks]**
9. Research article .....**[10 marks]**
10. Proposal .....**[10 marks]**
11. Report ..... [**10 marks]**

COMPUTER GRAPHICS

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]**
    - Scan-Converting A Point
    - Scan-Converting A Straight Line: DDA Line Algorithm, Bresenham's Line Algorithm
    - Scan-Converting a Circle and an Ellipse: Mid-Point Circle and Ellipse Algorithm
3. **Two –Dimensional Transformations ----[6 hours]**
    - Two –dimensional translation, rotation, scaling, reflection, shear transforms
    - Two-dimensional composite transformation
    - 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]**
    - Three –dimensional translation, rotation, scaling, reflection, shear transforms
    - Three-dimensional composite transformation
    - 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]**
    - Image Space and Object Space techniques
    - Back Face Detection, Z-Buffer, A-Buffer, Scan-Line method
8. **Illumination and Surface Rendering methods ----[8 hours]**
    - Algorithms to simulate ambient, diffuse and specular reflections
    - 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.

Chapters	1	2	3	4	5	6	7	8	9
Hours	2	6	6	6	4	4	6	8	3
Marks	4	10	10	10	8	8	10	14	6

COMPUTER ORGANIZATION AND ARCHITECTURE

1. **Introduction (3 hours) ----[6]**
    - Computer organization and architecture
    - Structure and function
    - Designing for performance
    - Computer components
    - Computer Function
    - Interconnection structures
    - Bus interconnection
    - PCI
2. **Central processing Unit (10 hours) ----[18]**
    - CPU Structure and Function
    - Arithmetic and logic Unit
    - Instruction formats
    - Addressing modes
    - Data transfer and manipulation
    - RISC and CISC
    - 64-Bit Processor
3. **Control Unit (6 hours) ----[10]**
    - Control Memory
    - Addressing sequencing
    - Computer configuration
    - Microinstruction Format
    - Symbolic Microinstructions
    - Symbolic Micro Program
    - Control Unit Operation
    - Design of control unit
4. **Pipeline and Vector processing (5 hours) ----[10]**
    - Pipelining
    - Parallel processing
    - Arithmetic Pipeline
    - Instruction Pipeline
    - RISC pipeline

- Vector processing
- Array processing

5. Computer Arithmetic (8 hours) ----[14]

- Addition algorithm
- Subtraction algorithm
- Multiplication algorithm
- Division algorithms
- Logical operation

6. Memory system (5 hours) ----[8]

- Microcomputer Memory
- Characteristics of memory systems
- The Memory Hierarchy
- Internal and External memory
- Cache memory principles
- Elements of Cache design
    - Cache size
    - Mapping function
    - Replacement algorithm
    - Write policy
    - Number of caches

7. Input-Output organization (6 hours) ----[10]

- Peripheral devices
- I/O modules
- Input-output interface
- Modes of transfer
    - Programmed I/O
    - Interrupt-driven I/O
    - Direct Memory access
- I/O processor
- Data Communication processor

8. Multiprocessors (2 hours) ----[4]

- Characteristics of multiprocessors
- Interconnection Structures
- Interprocessor Communication and synchronization

DATA COMMUNICATION

1. **Introduction [4 hours]**
    - Data and Signal
    - Analog and Digital Signal
    - Data Representation
    - Analog and Digital Data Communication System
    - Transmission Impairments (Attenuation, Noise, Distortion)
2. **Signals and Systems [4 hours]**
    - **Signal and Classification of Signals:** Periodic and Non-periodic Signals, Deterministic and Random Signals, Energy and Power Signals, Continuous Time and Discrete Time Signals
    - **System and Basic Properties of Systems**: System with and without memory, Linearity, Time Invariance, Invertibility, Casuality, Stability
3. **Signal Analysis [6 hours]**
    - Unit Impulse Function and Unit Step Function
    - LTI System and Impulse Response
    - Fourier Series Representation of Continuous Time Signal
    - Fourier Transform of Continuous Time Signal
    - Spectral Analysis of a Signal, Signal Bandwidth
4. **Transmission Media [4 hours]**
    - Electromagnetic Spectrum for Communication and Type of Propagation
    - **Guided Transmission Media:** Copper Media (Twisted pair and Co-axial) and Fiber Optics
    - **Unguided Communication Bands and Antennas Unguided Transmission Media:** Terrestrial Microwaves, Satellite Communication and Cellular System
    - **Data Rate Limits:** Nyquist Bit Rate for Noiseless Channel, Shannon Capacity for Noisy Channel
    - Performance of Channel: Bandwidth, Throughput, Latency, Jitter, Bit Error Rate (BER)
5. **Data Encoding and Modulation [10 hours]**
    - Baseband Communication (Analog/Digital)
    - Data Encoding and Modulation
    - Types of Analog Modulation: Amplitude Modulation, Frequency Modulation and Phase Modulation

- Pulse Modulation System: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM)
- Encoding Analog Data as Digital Signal: Pulse Code Modulation (PCM)
- Encoding Digital Data as Digital Signals
- Line Coding Schemes: NRZ, RZ, Manchester, AMI
- Block Coding, Scrambling
- Digital Modulation: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Quadrature Amplitude Modulation (QAM)

6. Multiplexing and Spreading [6 hours]

- Multiplexing and Application
- Frequency Division Multiplexing (FDM), Wavelength-Division Multiplexing (WDM)
- Time Division Multiplexing (TDM)
- Spread Spectrum Code-Division Multiple Access (CDMA)

7. Switching [3 hours]

- Switching and Application
- Circuit Switching and Packet Switching
- Datagram Switching and Virtual Circuit Switching
- X.25, Frame Relay, ATM

8. Information Theory and Coding [8 hours]

- Introduction to Information Theory, Average Information
- Source Coding – Huffman Coding
- Error Detection and Correction Codes
- Hamming Distance
- Linear Block Coding
- Cyclic Codes, CRC
- Convolution Codes

Chapters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Hours	**4**	**4**	**6**	**4**	**10**	**6**	**3**	**8**	**45**
Marks	**8**	**8**	**10**	**8**	**18**	**10**	**5**	**15**	**80**

INSTRUMENTATION II

1. **Microprocessor Based Instrumentation System (4 hours) ----[8]**
    - Basic Features of Microprocessor Based System
    - Open Loop and Closed Loop Microprocessor Based System
    - Benefits of Microprocessor Based System
    - Microcomputer on Instrumentation Design
    - Interfacing With Microprocessor
        - PC Interfacing Techniques
        - Review of Address Decoding
        - Memory Interfacing
        - Programmed I/O, Interrupt Driven I/O and Direct Memory Access (DMA)
2. **Parallel Interfacing with Microprocessor Based System (4 hours) ----[8]**
    - Methods of Parallel Data Transfer: Simple Input and Output, Strobe I/O, Single Handshake I/O, & Double Handshake I/O
    - 8255 as General Purpose Programmable I/O Device and its interfacing examples
    - Parallel Interfacing with ISA and PCI bus
3. **Serial Interfacing with Microprocessor Based System (6 hours) ----[10]**
    - Advantages of Serial Data Transfer Over Parallel
    - Synchronous and Asynchronous Data Transfer
    - Errors in Serial Data Transfer
    - Simplex, Half Duplex and Full Duplex Data Communication
    - Parity and Baud Rates
    - Introduction Serial Standards RS232, RS423, RS422
    - Universal Serial Bus
        i. The Standards: - USB 1.1 and USB 2.0
        ii. Signals, Throughput & Protocol
        iii. Devices, Hosts and On-The-Go
        iv. Interface Chips: - USB Device and USB Host

4. **Interfacing A/D And D/A Converters (4 hours) ----[8]**
    - Introduction
    - General Terms Involved in A/D and D/A Converters
    - Examples of A/D and D/A Interfacing
    - Selection of A/D and D/A Converters Based on Design Requirements
5. **Data Acquisition and Transmission (5 hours) ----[8]**
    - Analog and Digital Transmission
    - Transmission Schemes
        i. Fiber Optics
        ii. Satellite
        iii. Bluetooth Devices
    - Data Acquisition System
        - Data Loggers
        - Data Archiving and Storage

6. **Grounding And Shielding (3 hours) ----[6]**
    - Outline for Grounding and Shielding
    - Noise, Noise Coupling Mechanism and Prevention
    - Single Point Grounding and Ground Loop
    - Filtering and Smoothing
    - Decoupling Capacitors and Ferrite Beads
    - Line Filters, Isolators and Transient Suppressors
    - Different Kinds of Shielding Mechanism
    - Protecting Against Electrostatic Discharge
    - General Rules for Design
7. **Circuit Design (3 hours) ----[6]**
    - Converting Requirements into Design
    - Reliability and Fault Tolerance
    - High Speed Design
        i. Bandwidth, Decoupling, Ground Bounce, Crosstalk, Impedance Matching, and Timing
        ii. Low Power Design
        iii. Reset and Power Failure Detection and interface Unit
8. **Circuit Layout (3 hours) ----[6]**
    - Circuits Boards and PCBs
    - Component Placement
    - Routing Signal Tracks
        i. Trace Density, Common Impedance, Distribution of Signals and Return, Transmission Line Concerns, Trace Impedance and Matching, and Avoiding Crosstalk.
    - Ground, Returns and Shields
    - Cables and Connectors
    - Testing and Maintenance
9. **Software For Instrumentation and Control Applications (4 hours) ----[8]**

- Types of Software, Selection and Purchase
- Software Models and Their Limitations
- Software Reliability
- Fault Tolerance
- Software Bugs and Testing
- Good Programming Practice
- User Interface
- Embedded and Real Time Software

10. Case Study (9 hours) ----[12]

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

PROBABILITY AND STATISTICS

1. Descriptive Statistics and Basic Probability (6 hours) ----[12]

- Introductions in statistics and its importance in engineering
- Describing data with graphs (bar, pie, line diagram, box plot)
- Describing data with numerical measure (measuring center, measuring variability)
- Basic probability additive law, multiplic active law, Baye's theorem

2. Discrete Probability Distribution (6 hours) ----[10]

- Discrete random variable
- Binomial probability distributions
- Negative binomial distribution
- Poison distribution
- Hyper geometric distributions

3. Continuous Probability Distributions (6 hours) ----[10]

- Continuous random variable and probability densities
- Normal distribution
- Gama distribution
- Chi-square distribution

4. Sampling Distribution (5 hours) ----[10]

- Population and sample
- Central limit theorems
- Sampling distribution of sample mean
- Sampling distributing of sampling proportion

5. Correlation and regression (6 hours) ---- [10]

- Least square methods

- An analysis of variance of linear regression model
- Inferences concerning least square method
- Multiple correlation and regression

6. **Inference concerning mean (6 hours) ----[10]**
    - Point estimation and interval estimation
    - Test of hypothesis
    - Hypothesis test concerning one mean
    - Hypothesis test concerning two means
    - One way ANOVA
7. **Inference concerning proportion (6 hours) ----[10]**
    - Estimation of proportions
    - Hypotheses concerning one proportion
    - Hypotheses concerning two proportions
    - Chi-square test of independence
8. **Application of computer on statistical data computing (4 hours) ----[8]**
    - Application of computer in computing statistical problem e.g., Scientific Calculator, EXCEL, SPSS, Matlab, etc.

SOFTWARE ENGINEERING

1. Software Process and requirements (12 hours) ----[20]
    - ♦ Software crisis
    - ♦ Software characteristics
    - ♦ Software quality attributes
    - ♦ Software process model
    - ♦ Process iteration
    - ♦ Process activities
    - ♦ Computer-aided software engineering
    - ♦ Functional and non – functional requirements
    - ♦ User requirements
    - ♦ System requirement
    - ♦ Interface specification
    - ♦ The software requirements documents
    - ♦ Feasibility study
    - ♦ Requirements elicitation and analysis
    - ♦ Requirements validation and management
2. System model (3 hours) ----[5]
    - ♦ Context models
    - ♦ Behavioral models
    - ♦ Data and object models
    - ♦ Structured methods

3. Architectural design (6 hours) ----[10]
    - Architectural design decisions
    - System organization
    - Modular decomposition styles
    - Control styles
    - Reference architectures
    - Multiprocessor architecture
    - Client –server architectures
    - Distributed object architectures
    - Inter-organizational distributed computing
4. Real-time software design (3 hours) ----[5]
    - System design
    - Real-time operating systems
    - Monitoring and control systems
    - Data acquisition systems
5. Software Reuse (3 hours) ----[5]
    - The reuse landscapes
    - Design patterns
    - Generator–based reuse
    - Application frameworks
    - Application system reuse
6. Component-based software engineering (2 hours) ----[3]
    - Components and components models
    - The CBSE process
    - Component composition
7. Verification and validation (3 hours) ----[10]
    - Planning verification and validation
    - Software inspections
    - Verification and formal methods
    - Critical System verification and validation
8. Software Testing and cost Estimation (4 hours) ----[8]
    - System testing
    - Component testing
    - Test case design
    - Test automation
    - Metrics for testing
    - Software productivity
    - Estimation techniques
    - Algorithmic cost modeling
    - Project duration and staffing
9. Quality management (5 hours) ----[10]
    - Quality concepts
    - Software quality assurance

- Software reviews
- Formal technical reviews
- Formal approaches to SQA
- Statistical software quality assurance
- Software reliability
- A framework for software metrics
- Matrices for analysis and design model
- ISO standards
- CMMI
- SQA plan
- Software certification

10. Configuration Management (2 hours) ----[4]
    - Configuration management planning
    - Change management
    - Version and release management
    - System building
    - CASE tools for configuration management