COMMUNICATION ENGLISH
SH….

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. 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.

Language lab		30 hours
Listening		12 hours
Activity I	General instruction on effective listening, factors influencing listening, and note-taking to ensure ttention. (Equipment Required: Laptop, multimedia, laser pointer, overhead projector, power point, DVD, video set, screen)	2 hours
Activity II :	Listening to recorded authentic instruction followed by exercises. (Equipment Required: Cassette player or laptop)	2 hours
Activity III	Listening to recorded authentic description followed by exercises. (Equipment Required: Cassette player or laptop)	4 hours
Activity IV	Listening to recorded authentic conversation followed by exercises (Equipment Required: Cassette player or laptop)	4 hours
Speaking		18 hours
Activity I	General instruction on effective speaking ensuring audience's attention, comprehension and efficient use of Audio-visual aids. (Equipment Required: Laptop, multimedia, laser pointer, DVD, video, overhead projector, power point, screen)	2 hours
Activity II	Making students express their individual views on the assigned topics	2 hours

	(Equipment Required: Microphone, movie camera)	
Activity III	Getting students to participate in group discussion on the assigned topics	4 hours
Activity IV	Making students deliver talk either individually or in group on the assigned topics (Equipment Required: Overhead projector, microphone, power point, laser pointer multimedia, video camera, screen)	8 hours
Activity V	Getting students to present their brief oral reports individually on the topics of their choice. (Equipment Required: Overhead projector, microphone, power point, laser pointer multimedia, video camera, screen)	2 hours

Evaluation Scheme:

Unit	Testing Items	Number of Questions	Marks Distribution*
I	Reading Passages	3	15
	Novel	1	5
	Novel	1	5
	Grammar	10 or 5	5
II	Composing & Editing strategies	1	5
	MLA and APA Comparison	1	4
	Writing Research Articles	1	10
	Writing notice, Agenda and minutes	1	5
	Writing Proposal	1	8
	I Writing Reports (Formal Report)	1	10
	II Writing short reports or Project Report	1	8
		Total	80

- **There may be minor Variation in marks distribution**

Language Lab

Title	Testing Items	Number of Questions	Marks Distribution
Language Lab	**Listening** - Instruction - Description - Conversation	3	10
	Speaking - Expressing Individual views - Group/Round Table discussion - Talk delivery - Presenting brief oral report	3	15

PROBABILITY AND STATISTICS

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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

9. Application of computer on statistical data computing (4 hours)
- 9.1. 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.

SOFTWARE ENGINEERING
CT

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

INSTRUMENTATION II
EX

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.

COMPUTER ORGANIZATION AND ARCHITECTURE
CT

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.

COMPUTER GRAPHICS
EX

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.

DATA COMMUNICATION
CT

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.

ENGINEERING ECONOMICS
CE

Lecture : 3 **Year : III**
Tutorial : 1 **Part : II**
Practical : 0

Course Objective:
After completing this course, students will be able to conduct simple economic studies. They will also be able to make evaluation of engineering projects and make decisions related to investment.

1. Introduction [3 hours]
- 1.1. Origin of Engineering Economy
- 1.2. Principles of Engineering Economy
- 1.3. Role of Engineers in Decision Making
- 1.4. Cash Flow Diagram.

2. Interest and Time Value of Money [6 hours]
- 2.1. Introduction to Time Value of Money
- 2.2. Simple Interest
- 2.3. Compound Interest
  - 2.3.1. Nominal Interest rate
  - 2.3.2. Effective Interest rate
  - 2.3.3. Continuous Compounding
- 2.4. Economic Equivalence
- 2.5. Development of Interest Formulas
  - 2.5.1. The Five Types of Cash flows
  - 2.5.2. Single Cash flow Formulas
  - 2.5.3. Uneven Payment Series
  - 2.5.4. Equal Payment Series
  - 2.5.5. Linear Gradient Series.
  - 2.5.6. Geometric Gradient Series.

3. Basic Methodologies of Engineering Economic Analysis [8 hours]
- 3.1. Determining Minimum Attractive (Acceptable) Rate of Return (MARR).
- 3.2. Payback Period Method
- 3.3. Equivalent Worth Methods
  - 3.3.1. Present Worth Method
  - 3.3.2. Future Worth Method.
  - 3.3.3. Annual Worth Method.
- 3.4. Rate of Return Methods
  - 3.4.1. Internal Rate of Return Method.
  - 3.4.2. External/Modified Rate of Return Method.
- 3.5. Public Sector Economic Analysis (Benefit Cost Ratio Method).
- 3.6. Introduction to Lifecycle Costing
- 3.7. Introduction to Financial and Economic Analysis

4. Comparative Analysis of Alternatives [6 hours]
- 4.1. Comparing Mutually Exclusive Alternatives having Same useful life by
  - 4.1.1. Payback Period Method and Equivalent Worth Method
  - 4.1.2. Rate of Return Methods and Benefit Cost Ratio Method
- 4.2. Comparing Mutually Exclusive Alternatives having different useful lives by
  - 4.2.1. Repeatability Assumption
  - 4.2.2. Co-terminated Assumption
  - 4.2.3. Capitalized Worth Method
- 4.3. Comparing Mutually Exclusive, Contingent and Independent Projects in Combination.

5. Replacement Analysis: [6 hours]
- 5.1. Fundamentals of Replacement Analysis
  - 5.1.1. Basic Concepts and Terminology
  - 5.1.2. Approaches for Comparing Defender and Challenger
- 5.2. Economic Service Life of Challenger and Defender
- 5.3. Replacement Analysis When Required Service Life is Long.
  - 5.3.1. Required Assumptions and Decision Framework
  - 5.3.2. Replacement Analysis under the Infinite Planning Horizon
  - 5.3.3. Replacement Analysis under the Finite Planning Horizon

6. Risk Analysis [6 hours]
- 6.1. Origin/Sources of Project Risks.
- 6.2. Methods of Describing Project Risks.
  - 6.2.1. Sensitivity Analysis
  - 6.2.2. Breakeven Analysis
  - 6.2.3. Scenario Analysis
- 6.3. Probability Concept of Economic Analysis
- 6.4. Decision Tree and Sequential Investment Decisions

7. Depreciation and Corporate Income Taxes [6 hours]
- 7.1. Concept and Terminology of Depreciation
- 7.2. Basic Methods of Depreciation
  - 7.2.1. Straight line method

7.2.2. Declining Balance Method
7.2.3. Sinking Fund Method,
7.2.4. Sum of the Year Digit Method
7.2.5. Modified Accelerated Cost Recovery System (MACRS)

7.3. Introduction to Corporate Income Tax.
7.4. After Tax Cash flow Estimate.
7.5. General Procedure for Making After Tax Economic Analysis.

8. Inflation and Its Impact on Project Cashflows. [4 hours]

8.1. Concept of Inflation.
8.2. Measuring Inflation
8.3. Equivalence Calculation Under Inflation
8.4. Impact of Inflation on Economic Evaluation

Tutorials:

1. Assignments,
2. Quizzes and 1 Case study.

References:

1. Chan S. Park, *Contemporary Engineering Economics,* Prentice Hall, Inc.
2. E. Paul De Garmo, William G. Sullivan and James A. Bonta delli, *Engineering Economy,* MC Milan Publishing Company.
3. James L. Riggs, David D. Bedworth and Sabah U. Randhawa, *Engineering Economics,* Tata MCGraw Hill Education Private Limited.

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	4	4
2	8	8
3	12	16
4	8	12
5	8	12
6	8	12
7	8	12
8	4	4
Total	60	80

*There may be minor variation in marks distribution.

EMBEDDED SYSTEM
EX ……

Lecture : 3 **Year : III**
Tutorial : 1 **Part : II**
Practical : 1.5

Course Objective:

To introduce students to understand and familiarization on applied computing principles in emerging technologies and applications for embedded systems

1. Introduction to Embedded System [3 Hours]
- 1.1 Embedded Systems overview
- 1.2 Classification of Embedded Systems
- 1.3 Hardware and Software in a system
- 1.4 Purpose and Application of Embedded Systems

2. Hardware Design Issues [4 Hours]
- 2.1 Combination Logic
- 2.2 Sequential Logic
- 2.3 Custom Single-Purpose Processor Design
- 2.4 Optimizing Custom Single-Purpose Processors

3. Software Design Issues [6 Hours]
- 3.1 Basic Architecture
- 3.2 Operation
- 3.3 Programmer's View
- 3.4 Development Environment
- 3.5 Application-Specific Instruction-Set Processors
- 3.6 Selecting a Microprocessor
- 3.7 General-Purpose Processor Design

4. Memory [5 Hours]
- 4.1 Memory Write Ability and Storage Permanence
- 4.2 Types of Memory
- 4.3 Composing Memory
- 4.4 Memory Hierarchy and Cache

5. Interfacing [6 Hours]
- 5.1 Communication Basics
- 5.2 Microprocessor Interfacing: I/O Addressing, Interrupts, DMA
- 5.3 Arbitration
- 5.4 Multilevel Bus Architectures
- 5.5 Advanced Communication Principles

6. Real-Time Operating System (RTOS) [8 Hours]
- 6.1 Operating System Basics
- 6.2 Task, Process, and Threads
- 6.3 Multiprocessing and Multitasking
- 6.4 Task Scheduling
- 6.5 Task Synchronization
- 6.6 Device Drivers

7. Control System [3 Hours]
- 7.1 Open-loop and Close-Loop control System overview
- 7.2 Control System and PID Controllers
- 7.3 Software coding of a PID Controller
- 7.4 PID Tuning

8. IC Technology [3 Hours]
- 8.1 Full-Custom (VLSI) IC Technology
- 8.2 Semi-Custom (ASIC) IC Technology
- 8.3 Programming Logic Device (PLD) IC Technology

9. Microcontrollers in Embedded Systems [3 Hours]
- 9.1 Intel 8051 microcontroller family, its architecture and instruction sets
- 9.2 Programming in Assembly Language
- 9.3 A simple interfacing example with 7 segment display

10. VHDL [4 Hours]
- 10.1VHDL overview
- 10.2Finite state machine design with VHDL

Practical:

Student should be complete project work related to this subject.

Reference Books:

1. David E. Simon, “An Embedded Software Primer”, Addison-Wesley, 2005
2. Muhammad Ali Mazidi, “8051 Microcontroller and Embedded Systems”, Prentice Hall, 2006
3. Frank Vahid, Tony Givargis, “Embedded System Design”, John Wiley & Sons, 2008
4. Douglas L. Perry, “VHDL Programming by example”, McGraw Hill, 2002

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	Mark Distribution*
1	3	4
2	4	8
3	6	8
4	5	8
5	6	8
6	8	12
7	3	8
8	3	8
9	3	8
10	4	8
Total	**45**	**80**

*There may be minor variation in marks distribution.

ARTIFICIAL INTELLIGENCE

CT

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

Course Objectives:
The main objectives of this course are:

- To provide basic knowledge of Artificial Intelligence
- To familiarize students with different search techniques
- To acquaint students with the fields related to AI and the applications of AI

1. Introduction (4 hrs)

1.1. Definition of Artificial Intelligence
1.2. Importance of Artificial Intelligence
1.3. AI and related fields
1.4. Brief history of Artificial Intelligence
1.5. Applications of Artificial Intelligence
1.6. Definition and importance of Knowledge, and learning.

2. Problem solving (4 hrs)

2.1. Defining problems as a state space search,
2.2. Problem formulation
2.3. Problem types, Well- defined problems, Constraint satisfaction problem,
2.4. Game playing, Production systems.

3. Search techniques (5 hrs)

3.1. Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison,
3.2. Informed search techniques-hill climbing, best first search, greedy search, A* search Adversarial search techniques-minimax procedure, alpha beta procedure

4. Knowledge representation, inference and reasoning (8 hrs)

4.1. Formal logic-connectives, truth tables, syntax, semantics, tautology, validity, well- formed-formula,
4.2. Propositional logic, predicate logic, FOPL, interpretation, quantification, horn clauses,
4.3. Rules of inference, unification, resolution refutation system (RRS), answer extraction from RRS, rule based deduction system,
4.4. Statistical Reasoning-Probability and Bayes' theorem and causal networks, reasoning in belief network

5. Structured knowledge representation (4 hrs)

5.1. Representations and Mappings,
5.2. Approaches to Knowledge Representation,
5.3. Issues in Knowledge Representation,
5.4. Semantic nets, frames,
5.5. Conceptual dependencies and scripts

6. Machine learning (6 hrs)

6.1. Concepts of learning,
6.2. Learning by analogy, Inductive learning, Explanation based learning
6.3. Neural networks,
6.4. Genetic algorithm
6.5. Fuzzy learning
6.6. Boltzmann Machines

7. Applications of AI (14 hrs)

7.1. Neural networks
  7.1.1. Network structure
  7.1.2. Adaline network
  7.1.3. Perceptron
  7.1.4. Multilayer Perceptron, Back Propagation
  7.1.5. Hopfield network
  7.1.6. Kohonen network
7.2. Expert System
  7.2.1. Architecture of an expert system
  7.2.2. Knowledge acquisition, induction
  7.2.3. Knowledge representation, Declarative knowledge, Procedural knowledge
  7.2.4. Development of expert systems
7.3. Natural Language Processing and Machine Vision
  7.3.1. Levels of analysis: Phonetic, Syntactic, Semantic, Pragmatic
  7.3.2. Introduction to Machine Vision

Practical:

Laboratory exercises should be conducted in either LISP or PROLOG. Laboratory exercises must cover the fundamental search techniques, simple question answering, inference and reasoning.

References:

1. E. Rich and Knight, *Artificial Intelligence*, McGraw Hill, 2009.
2. D. W. Patterson, *Artificial Intelligence and Expert Systems*, Prentice Hall, 2010.
3. P. H. Winston, *Artificial Intelligence*, Addison Wesley, 2008.
4. Stuart Russel and Peter Norvig, *Artificial Intelligence A Modern Approach*, Pearson, 2010

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	7
2	4	7
3	5	9
4	8	14
5	4	7
6	6	10
7	14	26
Total	45	80

*There can be minor deviations in the numbers

DATABASE MANAGEMENT SYSTEMS

…….

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

Course Objectives:
The course objective is to provide fundamental concept, theory and practices in design and implementation of Database Management System.

1. Introduction [3 hours]
- 1.1. Concepts and Applications
- 1.2. Objective and Evolution
- 1.3. Data Abstraction and Data Independence
- 1.4. Schema and Instances
- 1.5. Concepts of DDL, DML and DCL

2. Data Models [7 hours]
- 2.1. Logical, Physical and Conceptual
- 2.2. E-R Model
- 2.3. Entities and Entities sets
- 2.4. Relationship and Relationship sets
- 2.5. Strong and Weak Entity Sets
- 2.6. Attributes and Keys
- 2.7. E-R Diagram
- 2.8. Alternate Data Model (hierarchical, network, graph)

3. Relational Languages and Relational Model [7 hours]
- 3.1. Introduction to SQL
- 3.2. Features of SQL
- 3.3. Queries and Sub-Queries
- 3.4. Set Operations
- 3.5. Relations (Joined, Derived)
- 3.6. Queries under DDL and DML Commands
- 3.7. Embedded SQL
- 3.8. Views
- 3.9. Relational Algebra
- 3.10. Database Modification
- 3.11. QBE and domain relational calculus

4. Database Constraints and Normalization [6 hours]
- 4.1. Integrity Constraints and Domain Constraints
- 4.2. Assertions and Triggering
- 4.3. Functional Dependencies
- 4.4. Multi-valued and Joined Dependencies
- 4.5. Different Normal Forms (1st, 2nd, 3rd, BCNF, DKNF)

5. Query Processing and Optimization [4 hours]
- 5.1. Query Cost Estimation
- 5.2. Query Operations
- 5.3. Evaluation of Expressions
- 5.4. Query Optimization
- 5.5. Query Decomposition
- 5.6. Performance Tuning

6. File Structure and Hashing [4 hours]
- 6.1. Records Organizations
- 6.2. Disks and Storage
- 6.3. Remote Backup System
- 6.4. Hashing Concepts, Static and Dynamic Hashing
- 6.5. Order Indices
- 6.6. B+ tree index

7. Transactions processing and Concurrency Control [6 hours]
- 7.1. ACID properties
- 7.2. Concurrent Executions
- 7.3. Serializability Concept
- 7.4. Lock based Protocols
- 7.5. Deadlock handling and Prevention

8. Crash Recovery [4 hours]
- 8.1. Failure Classification
- 8.2. Recovery and Atomicity
- 8.3. Log-based Recovery
- 8.4. Shadow paging
- 8.5. Advanced Recovery Techniques

9. Advanced database Concepts [4 hours]
- 9.1. Concept of Objet-Oriented and Distributed Database Model
- 9.2. Properties of Parallel and Distributed Databases
- 9.3. Concept of Data warehouse Database
- 9.4. Concept of Spatial Database

Practical:

1: Introduction and operations of MS-Access or MySQL or any suitable DBMS
2: Database Server Installation and Configuration (MS-SQLServer, Oracle)
3: DB Client Installation and Connection to DB Server. Introduction and practice with SELECT Command with the existing DB.
4, 5: Further Practice with DML Commands
6, 7: Practice with DDL Commands. (Create Database and Tables).
8**:** Practice of Procedure/Trigger and DB Administration & other DBs (MySQL, PG-SQL, DB2.)
9, 10, 11: Group Project Development.
12: Project Presentation and Viva

References

1. H. F. Korth and A. Silberschatz, " *Database system concepts*", McGraw Hill, 2010.
2. A. K. Majumdar and P. Bhattacharaya, "*Database Management Systems*", Tata McGraw Hill, India, 2004.

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	3	4
2	7	12
3	7	12
4	6	12
5	4	8
6	4	8
7	6	12
8	4	6
9	4	6
Total	45	80

*There can be minor deviations in the numbers

OBJECT ORIENTED ANALYSIS AND DESIGN
CT

Lecture : 3 **Year : III**
Tutorial : **Part : II**
Practical : 3/2

Course Objectives:

- Explain and illustrate the fundamental concepts of object orientation
- To introduce basic concepts of object-oriented analysis and design.
- To study the main features of the software development process in an object-oriented framework.
- To provide exposure to Visual Object Oriented Modeling languages, specifically UML (Unified Modeling Language).
- Read, verify, and validate a given specification presented in UML
- Given a system requirements description, produce a specification and implementation using UML

1. Object Oriented Fundamentals (10 hours)

1.1 Introduction,
1.2 Object Oriented Analysis and Design,
1.3 Defining Models,
1.4 Case Study,
1.5 Requirement Process,
1.6 Use Cases,
1.7 Object Oriented Development Cycle,
1.8 Overview of the Unified Modeling Language: UML Fundamentals and Notations.

2. Object Oriented Analysis (8 hours)

2.1 Building Conceptual Model,
2.2 Adding Associations and Attributes,
2.3 Representation of System Behavior.

3. Object Oriented Design (12 hours)

3.1 Analysis to Design,
3.2 Describing and Elaborating Use Cases,
3.3 Collaboration Diagram,
3.4 Objects and Patterns,
3.5 Determining Visibility,
3.6 Class Diagram.

4. Implementation (15 hours)

4.1 Programming and Development Process,
4.2 Mapping Design to Code,
4.3 Creating Class Definitions from Design Class Diagrams,
4.4 Creating Methods from Collaboration Diagram,
4.5 Updating Class Definitions,
4.6 Classes in Code,
4.7 Exception and Error Handling.

Practical:

Laboratory Exercise will include handling a object oriented design and modeling activity in a ACSE Environment. UML pattern design and modeling will be taken up with the help of *UML Software*.

Reference Books:

1. Larman, C., *Applying UML and Patterns*, Pearson Education Asia, 2008.
2. Stevens, P., Pooley, R., *Using UML: Software Engineering with Objects and Components*, Addision-Wesley, 2009.
3. Fowler, M., Scott, K., *UML Distilled: Applying the Standard Object Modeling Language*, Addison-Wesley, 2007.
4. Booch, G., Jacobson, I., Rumbaugh, J., *The Unified Software Development Process*, Addison-Wesely, 2009.
5. Booch, G., Jacobson, I., Rumbaugh, J., *The Unified Modeling Language User Guide*, Addison-Wesely, 2008.
6. Jacobson I., *Object-Oriented Software Engineering – A Use Case Driven Approach*, Addison-Wesely, 2009.

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	10	18
2	8	14
3	12	21
4	15	27
Total	45	80

*There can be minor deviations in the numbers

OPERATING SYSTEM
CT

Lecture : 3 **Year : III**
Tutorial : 1 **Part : II**
Practical : 1.5

Course Objective:
The objective of the course is to be familiar with the different aspects of operating system and use the idea in designing operating system.

1. Introduction (5 hours)
- 1.1. Operating System and Function
- 1.2. Evolution of Operating System
- 1.3. Type of Operating System: Batch, Interactive, Multiprocessing, Time Sharing and Real Time System
- 1.4. Operating System Components
- 1.5. Operating System Structure: Monolithic, Layered, Micro-Kernel, Client-Server, Virtual Machine
- 1.6. Operating System Services
  - 1.6.1. System calls
  - 1.6.2. Shell commands
  - 1.6.3. Shell programming
- 1.7. Examples of O. S.: UNIX, Linux, MS-Windows, Handheld OS.

2. Process Management (6 hours)
- 2.1. Introduction to Process
  - 2.1.1. Process description
  - 2.1.2. Process states
  - 2.1.3. Process control
- 2.2. Threads
- 2.3. Processes and Threads
- 2.4. Scheduling
  - 2.4.1. Types of scheduling
  - 2.4.2. Scheduling in batch system
  - 2.4.3. Scheduling in Interactive System
  - 2.4.4. Scheduling in Real Time System
  - 2.4.5. Thread Scheduling
- 2.5. Multiprocessor Scheduling concept

3. Process Communication and Synchronization (5 hours)
- 3.1. Principles of Concurrency
- 3.2. Critical Region
- 3.3. Race Condition
- 3.4. Mutual Exclusion
- 3.5. Semaphores and Mutex
- 3.6. Message Passing
- 3.7. Monitors
- 3.8. Classical Problems of Synchronization: Readers-Writers Problem, Producer Consumer Problem, Dining Philosopher problem

4. Memory Management (6 hours)
- 4.1. Memory address, Swapping and Managing Free Memory Space
- 4.2. Resident Monitor
- 4.3. Multiprogramming with Fixed Partition
- 4.4. Multiprogramming With Variable Partition
- 4.5. Multiple Base Register
- 4.6. Virtual Memory Management
  - 4.6.1. Paging
  - 4.6.2. Segmentation
  - 4.6.3. Paged Segmentation
- 4.7. Demand Paging
- 4.8. Performance
- 4.9. Page Replacement Algorithms
- 4.10. Allocation of Frames
- 4.11. Thrashing

5. File Systems (6 hours)
- 5.1. File: Name, Structure, Types, Access, Attribute, Operations
- 5.2. Directory and File Paths
- 5.3. File System Implementation
  - 5.3.1. Selecting Block Size
  - 5.3.2. Impact of Block Size Selection
  - 5.3.3. Implementing File: Contiguous Allocation, Link List Allocation, Link List Allocation with Table, Inode
  - 5.3.4. Implementing Directory
- 5.4. Impact of Allocation Policy on Fragmentation
- 5.5. Mapping File Blocks on The Disk Platter
- 5.6. File System Performance
- 5.7. Example File Systems: CD ROM file system, MS-DOS file system, Unix File system

6. I/O Management & Disk Scheduling (4 hours)

6.1. Principles of I/O Hardware
6.2. Principles of I/O software
6.3. I/O software Layer
6.4. Disk
  6.4.1. Hardware
  6.4.2. Formatting
  6.4.3. Arm scheduling
  6.4.4. Error handling
  6.4.5. Stable Storage

7. Deadlock (5 hours)

7.1. Principles of deadlock
7.2. Deadlock Prevention
7.3. Deadlock Avoidance
7.4. Deadlock Detection
7.5. Recovery from deadlock
7.6. An Integrated Deadlock Strategies
7.7. Other Issues: Two phase locking, Communication Deadlock, Livelock, Starvation

8. Security (4 hours)

8.1. Security breaches
8.2. Types of Attacks
8.3. Security Policy and Access Control
8.4. Basics of Cryptography
8.5. Protection Mechanisms
8.6. Authentication
8.7. OS Design Considerations For Security
8.8. Access Control Lists And OS Support

9. System administration (4 hours)

9.1. Administration Tasks
9.2. User Account Management
9.3. Start And Shutdown Procedures
9.4. Setting up Operational Environment for a New User
9.5. AWK tool, Search, Sort tools, Shell scripts, Make tool

Practical:

1. Shell commands, shell programming: write simple functions, basic tests, loops, patterns, expansions, substitutions
2. Programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Programs using the I/O system calls of UNIX operating system
4. Implement the Producer – Consumer problem using semaphores.
5. Implement some memory management schemes

Reference Books:

1. Andrew S. Tanenbaum, "Modern Operating Systems", 3rd Edition, PHI
2. Stalling William, "Operating Systems", 6th Edition, Pearson Education
3. Silbcrschatz A.,Galvin P., Gagne G., "Operating System Concepts", 8th Edition, John Wiley and Sons,
4. Milan Milenkovic, "Operating Systems Concepts and Design", TMGH
5. Das Sumitabha, "Unix Concepts and Applications", 3rd Edition, Tata McGraw Hill, 2003
6. M. J. Bach, "The Design of The Unix Operating System", PHI.
7. Charles Crowley, "Operating Systems: A Design-oriented Approach", TMH.

Evaluation Scheme:

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

Chapters	Hour	Marks Distribution*
1	5	10
2	6	10
3	5	10
4	6	10
5	6	10
7	5	10
6, 8, 9	12	20
Total	**45**	**80**

*There may be minor deviation in marks distribution

MINOR PROJECT

Practical : 4 **Year : III**
Part : II

Objectives:
To carry out a small scale project to develop hands-on experience of working in a project. During the course, the student will also develop knowledge of application development platforms and tools (Java /C# dotnet / Visual C++/PHP or any platform of current trend). The students will learn working as a team and basic collaboration and project management skills. The student will also learn about formulating project documentations.

1. **Project ideas and proposal guidance** **(4 hours)**

2. **Application development** **(10 hours)**
   a. Visual programming (object oriented)
      i. Language basics
      ii. Frameworks and APIs
   b. Programming basics and design patterns

3. **Project management, team work and collaboration** **(8 hours)**
   a. Project management techniques
   b. Collaborative development environment

4. **Project guidance** **(5 hours)**

5. **Project work** **(30 hours)**

6. **Project documentation guidance** **(3 hours)**