B.E. DEGREE
IN
ELECTRONICS & COMMUNICATION ENGINEERING

Year : III

Part : I

Teaching Schedule							Examination Scheme							
							Theory			Practical			Total	Remark
S. N.	Course Code	Course Title	L	T	P	Total	Assesment Marks	Final		Assesment Marks	Final			
								Duaration hours	Marks		Duaration hours	Marks		
1	SH 601	Communication English	3	1	2	6	20	3	80	25			125	
2	SH 602	Probability and Statistics	3	1		4	20	3	80				100	
3	EE 602	Control System	3	1	1.5	5.5	20	3	80	25			125	
4	EX 602	Instrumentation II	3	1	1.5	5.5	20	3	80	25			125	
5	EX 603	Computer Graphics	3	1	3	7	20	3	80	50			150	
6	EX 601	Advanced Electronics	3	1	1.5	5.5	20	3	80	25			125	
7	CT 603	Computer Organization & Architecture	3	1	1.5	5.5	20	3	80	25			125	
		Total	**21**	**7**	**11**	**39**	**140**	**21**	**560**	**175**			**875**	

COMMUNICATION ENGLISH
SH 601

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

Course Introduction

This course is designed for the students of engineering with the objective of developing all four skills of communication applicable in professional field.

Course Objectives

After completion of this course students will be able to:

a. comprehend reading materials both technical and semi-technical in nature
b. develop grammatical competence
c. write notice, agenda, minutes
d. write proposals
e. write reports
f. write research articles
g. listen and follow instruction, description and conversation in native speakers' accent
h. do discussion in group, deliver talk and present brief oral reports

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: Introduction to technical writing process and meeting **(4 hours)**

1. Editing, MLA/APA **(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

Unit III: Writing Proposal **(6 hours)**

1. Introduction

1.1 Parts of the proposal
- 1.1.1 Title page
- 1.1.2 Abstract/Summary
- 1.1.3 Statement of Problem
- 1.1.4 Rationale
- 1.1.5 Objectives
- 1.1.6 Procedure/Methodology
- 1.1.7 Cost estimate or Budget
- 1.1.8 Time management/Schedule
- 1.1.9 Summary
- 1.1.10 Conclusion
- 1.1.11 Evaluation or follow-up
- 1.1.12 Works cited

Unit IV: Reports **(18hours)**

1. Informal Reports **(6 hours)**

1.1 Memo Report
- 1.1.1 Introduction
- 1.1.2 Parts

1.2 Letter Report
- 1.2.1 Introduction
- 1.2.2 Parts

2. Project/Field Report **(3 hours)**

- 2.2.1 Introduction
- 2.2.2 Parts

3. Formal report **(9 hours)**

3.1 Introduction
3.2 Types of Formal Reports
- 3.2.1 Progress Report
- 3.2.2 Feasibility Report
- 3.2.3 Empirical/ Research Report
- 3.2.4 Technical Report

3.3 Parts and Components of Formal Report
- 3.3.1 Preliminary section
  - 3.3.1.1 Cover page
  - 3.3.1.2 Letter of transmittal/Preface
  - 3.3.1.3 Title page
  - 3.3.1.4 Acknowledgements
  - 3.3.1.5 Table of Contents
  - 3.3.1.6 List of figures and tables
  - 3.3.1.7 Abstract/Executive summary
- 3.3.2 Main Section
  - 3.3.2.1 Introduction
  - 3.3.2.2 Discussion/Body
  - 3.3.2.3 Summary/Conclusion
  - 3.3.2.4 Recommendations
- 3.3.3 Documentation
  - 3.3.3.1 Notes (Contextual/foot notes)
  - 3.3.3.2 Bibliography
  - 3.3.3.3 Appendix

Unit V: Writing Research Articles **(2 hours)**

1.1. Introduction
1.2. Procedures

Language lab		30 hours
Unit I: 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
Unit II: 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 (Equipment Required: Microphone, movie camera)	2 hours
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

Units	Testing Items	No. of Questions	Type of Questions	Marks Distribution	Total Marks	Remarks
I	Reading	3	For grammar = objective and for the rest = short	2 Short questions 5+5 Interpretation of text 5 Note + Summary 5+5 Grammar 5	30	For short questions 2 to be done out of 3 from the seen passages, for interpretation an unseen paragraph of about 75 words to be given, for note + summary an unseen text of about 200to 250 to be given, for grammar 5 questions of fill up the gaps or transformation type to be given
II	Introduction to technical writing process and meeting	3	MLA/APA = objective, Editing and Meeting = short	MLA/APA = 4 Editing = 5 Meeting = 5	14	For APA/MLA 4 questions to be given to transform one from another or 4 questions asking to show citation according to APA/ MLA technique, For meeting minute alone or notice with agendas to be given
III	Proposal Writing	1	Long	10	10	A question asking to write a very brief proposal on any technical topic to be given
IV	Report writing	2	Informal report = short, Formal report = long	Informal report = 6 Formal report = 10	16	A question asking to write very brief informal report on technical topic to be given, for formal report a question asking to write in detail on any three elements of a formal report on technical topic to be given
V	Research article	1	Long	10	10	A question asking to write a brief research article on technical topic to be given

Evaluation Scheme for Lab

Units	Testing items	No. of Questions	Type of questions	Marks Distribution	Remarks
I	Listening ▫ instruction ▫ description ▫ conversation	2	objective	5+5	listening tape to be played on any two out of instruction, description and conversation followed by 10multiple choice type or fill in the gaps type questions

II	Speaking ▫ group/round table discussion ▫ presenting brief oral report ▫ delivering talk	2	subjective	Round table discussion 5, talk or brief oral report =10	Different topics to be assigned in groups consisting of 8 members for group discussion and to be judged individually, individual presentation to be judged through either by talk on assigned topics or by brief oral reports based on their previous project, study and field visit.

Prescribed books

1. Adhikari, Usha, Yadav, Rajkumar, Yadav, Bijaya, ; " A Course book of Communicative English", Trinity Publication.
2. Adhikari, Usha, Yadav, Rajkumar, Shrestha, Rup Narayan ; "Technical Communication in English", Trinity Publication.

   (Note: 50 marks excluding reading to be covered on the basis of first book and reading part (i.e. 30 marks) to be covered on the basis of second book)

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

PROBABILITY AND STATISTICS
SH 602

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

Course Objective:

To provide the students with practical 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. Inference Concerning Mean (6 hours)

5.1 Point estimation and interval estimation
5.2 Test of Hypothesis
5.3 Hypothesis test concerning One mean
5.4 Hypothesis test concerning two mean
5.5 One way ANOVA

6. Inference concerning Proportion **(6 hours)**

6.1 Estimation of Proportions
6.2 Hypothesis concerning one proportion
6.3 Hypothesis concerning two proportion
6.4 Chi square test of Independence

7. Correlation and Regression **(6 hours)**

7.1 Correlation
7.2 Least square method
7.3 An analysis of variance of Linear Regression model
7.4 Inference concerning Least square method
7.5 Multiple correlation and regression

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", Miller and Freund's publication.
2. Jay L. Devore, "Probability and Statistics for Engineering and the Sciences", Brooks/Cole publishing Company, Monterey, California.
3. Richard I. Levin, David S Rubin, "Statistics For Management", Prentice Hall publication.
4. Mendenhall Beaver Beaver, "Introduction Probability and statistics", Thomson Brooks/Cole.

CONTROL SYSTEM
EE 602

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

Course Objectives:

To present the basic concepts on analysis and design of control system and to apply these concepts to typical physical processes.

1. Control System Background **(2 hours)**

1.1 History of control system and its importance
1.2 Control system: Characteristics and Basic features
1.3 Types of control system and their comparison

2. Component Modeling **(6 hours)**

2.1 Differential equation and transfer function notations
2.2 Modeling of Mechanical Components: Mass, spring and damper
2.3 Modeling of Electrical components: Inductance, Capacitance, Resistance, DC and AC motor, Transducers and operational amplifiers
2.4 Electric circuit analogies (force-voltage analogy and force- current analogy)
2.5 Linearized approximations of non-linear characteristics

3. System Transfer Function and Responses **(6 hours)**

3.1 Combinations of components to physical systems
3.2 Block diagram algebra and system reduction
3.3 Signal flow graphs
3.4 Time response analysis:
  3.4.1 Types of test signals (Impulse, step, ramp, parabolic)
  3.4.2 Time response analysis of first order system
  3.4.3 Time response analysis of second order system
  3.4.4 Transient response characteristics
3.5 Effect of feedback on steady state gain, bandwidth, error magnitude and system dynamics

4. Stability **(4 hours)**

4.1 Introduction of stability and causes of instability
4.2 Characteristic equation, root location and stability
4.3 Setting loop gain using Routh-Hurwitz criterion
4.4 R-H stability criterion
4.5 Relative stability from complex plane axis shifting

5. Root Locus Technique **(7 hours)**

5.1 Introduction of root locus

5.2 Relationship between root loci and time response of systems
5.3 Rules for manual calculation and construction of root locus
5.4 Analysis and design using root locus concept
5.5 Stability analysis using R-H criteria

6. Frequency Response Techniques **(6 hours)**

6.1 Frequency domain characterization of the system
6.2 Relationship between real and complex frequency response
6.3 Bode Plots: Magnitude and phase
6.4 Effects of gain and time constant on Bode diagram
6.5 Stability from Bode diagram (gain margin and phase margin)
6.6 Polar Plot and Nyquist Plot
6.7 Stability analysis from Polar and Nyquist plot

7. Performance Specifications and Compensation Design **(10 hours)**

7.1 Time domain specification
  7.1.1 Rise time, Peak time, Delay time, settling time and maximum overshoot
  7.1.2 Static error co-efficient
7.2 Frequency domain specification
  7.2.1 Gain margin and phase margin
7.3 Application of Root locus and frequency response on control system design
7.4 Lead, Lag cascade compensation design by Root locus method.
7.5 Lead, Lag cascade compensation design by Bode plot method.
7.6 PID controllers

8. State Space Analysis **(4 hours)**

8.1 Definition of state -space
8.2 State space representation of electrical and mechanical system
8.3 Conversion from state space to a transfer function.
8.4 Conversion from transfer function to state space.
8.5 State-transition matrix.

Practical:

1. To study open loop and closed mode for d.c motor and familiarization with different components in D.C motor control module.
2. To determine gain and transfer function of different control system components.
3. To study effects of feedback on gain and time constant for closed loop speed control system and position control system.
4. To determine frequency response of first order and second order system and to get transfer function.
5. Simulation of closed loop speed control system and position control system and verification

References:

1. Ogata, K., "Modern Control Engineering", Prentice Hall
2. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill
3. Kuo, B.C., "Automatic Control System", Prentice Hall
4. Nagrath & Gopal, "Modern Control Engineering", New Ages International

ADVANCED ELECTRONICS
EX 601

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

Course Objectives:

To provide knowledge on data conversion, amplifiers, instrumentation and power circuits

1. Operational Amplifier Circuits **(6 hours)**

1.1 Bias circuits suitable for IC Design
1.2 The Widlar current source
1.3 The differential amplifier
1.4 Active loads
1.5 Output stages

2. Operational Amplifier Characterization **(8 hours)**

2.1 Input offset voltage
2.2 Input bias and input offset currents
2.3 Output impedance
2.4 Differential and common-mode input impedance
2.5 DC gain, bandwidth, gain-bandwidth product
2.6 Common-mode and power supply rejection ratios
2.7 Higher frequency poles settling time
2.8 Slew rate
2.9 Noise in operational amplifier circuits

3. Digital-To-Analog and Analog-To-Digital Conversion **(8 hours)**

3.1 The R-2R ladder circuit
3.2 Unipolar and bipolar D/A converters
3.3 Count-up and Tracking A/D's based on D/A's
3.4 Successive approximation A/D converters
3.5 Integrating voltage-to-time conversion A/D converters, dual and quad slope types
3.6 Sigma delta A/D converters
3.7 Flash A/D converters

4. Instrumentation and Isolation Amplifiers **(4 hours)**

4.1. One and two operational amplifier instrumentation amplifiers
4.2. The three operational amplifier instrumentation amplifier
4.3. Consideration of non-ideal properties
4.4. Isolation amplifier principles and realization
4.5. Consideration of non-ideal properties

5. Operational Amplifier-Bipolar Transistor Logarithmic Amplifier (3 hours)

5.1 The basic logarithmic amplifier
5.2 Non-ideal effects
5.3 Stability consideration
5.4 Anti-logarithmic operations

6. Log-Antilog Circuit Application (5 hours)

6.1 Analog multiplier based on log-antilog principles
6.2 The multifunction converter circuit
6.3 Proportional to absolute temperature (PTAT) devices
6.4 RMS to dc conversion

7. Introduction to Power Electronics (7 hours)

7.1 Diodes, thyristors, triacs, IGBT
7.2 Controlled rectifier circuits
7.3 Inverters
7.4 Choppers
7.5 DC-to-DC conversion
7.6 AC-to-AC conversion

8. Switched Power Supplies (4 hours)

8.1 Voltage step-down regulators
8.2 Voltage step-up regulators
8.3 Step-up/step-down regulators
8.4 Filtering considerations
8.5 Control circuits, IC switched

Practical:

1. Characteristics of operational amplifier
2. 4 bit D to A converter
3. Differential amplifier, Instrumentation amplifier
4. Logarithmic amplifier
5. Study of switched voltage regulator
6. Study of Silicon-controlled-rectifier (SCR) and TRIAC circuit

Reference:

1. A.S. Sedra and K.C. Smith, "Microelectronic Circuits", Oxford University Press.
2. W. Stanely, "Operational Amplifiers with Linear Integrated Circuits", Charles E. Merrill Publishing Company, Toronto.
3. Jacob Millman and Christos C. Halkias, "Integrated Electronics", TATA McGRAW- Hill Edition.
4. Muhammad H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education.

5. Ramakant A. Gayakwad, "Operational Amplifiers with Linear Integrated Circuits", Prentice Hall, New Delhi.
6. Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Prentice Hall, New Delhi.
7. C.W. Lander, "Power Electronics", McGraw-Hill Book Company, New York.
8. J.G. Graeme, "Application of Operational Amplifiers: Third Generation Techniques", The Burr-Brown Electronics Series, McGraw-Hill, New York.
9. N. Mohan, T. M. Undeland and W. P, Robbins, "Power Electronics: Converters, Applications and Design", John Willey and Sons, New York.

INSTRUMENTATION II
EX 602

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

Course Objective:

To introduce and apply the knowledge of microprocessor, A/D, D/A converter to design Instrumentation system and to provide the concept of 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
7.4 Bandwidth, Decoupling, Ground Bounce, Crosstalk, Impedance Matching, and Timing
7.5 Low Power Design
7.6 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
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:

1. D. V. Hall, "Microprocessor and Interfacing, Programming and Hardware" Tata McGraw Hill
2. K.R. Fowler, "Electronic Instrument Design: Architecting for the Life Cycle", Oxford University Press
3. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Application with 8085", Prentice Hall
4. A.K. Ray & K.M. Bhurchandi, **"Advanced Microprocessors And Peripherals"**, Tata McGraw Hill
5. E.O. Duebelin, "Measurement System Application And Design", Tata McGraw Hills
6. John Hyde, "USB Design By Example", Intel Press
7. PCI bus, USB, 8255,Bluetooth datasheets
8. D. M. Consodine, "Process Instruments and Controls Handbook", McGraw-Hill,New York.
9. S. Wolf and R. F. Smith, "Student Reference Manual for Electronic Instrumentation Laboratories", Prentice Hall, Englewood Cliffs, New Jersey.
10. S. E. Derenzo, "Interfacing: A Laboratory Approach Using the Microcomputer for Instrumentation, Data Analysis, and Control", Prentice Hall, Englewood Cliffs, New Jersey.

COMPUTER GRAPHICS
EX 603

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

Course Objectives:

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.

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

References

1. Donald Hearn and M. Pauline Baker, "Computer Graphics C version"
2. Donald D. Hearn and M. Pauline Baker, "Computer Graphics with OpenGL"
3. Foley, Van Dam, Feiner, Hughes "Computer Graphics Principles and Practice"

COMPUTER ORGANIZATION AND ARCHITECTURE

CT 603

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

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"
2. William Stalling, "Computer organization and architecture"
3. John P. Hayes, "Computer Architecture and Organization"
4. V.P. Heuring, H.F. Jordan, "Computer System design and architecture"
5. S. Shakya, "Lab Manual on Computer Architecture and design"