CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 6C			THEORY PAPER
	VLSI Design	EI701	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	2	

COURSE CONTENTS

Unit-I

Introduction to CMOS circuit, Circuit & System representation Behavioral representation, structural representation. Physical representation MOS transistor theory. NMOS and PMOS enhancement transistor. Threshold voltage, body effect. MOS device design equation. Basic DC equation, second order effects, MOS models.

Unit-II

The complementary CMOS inverter-DC character, Static load MOS inverters. The differential inverter. Tristate inverter. Bipolar devices, diodes, transistors, BICMOS inverters.

Unit-III

Review of silicon semiconductor technology and basic CMOS technology-n-well and p-well process. Interconnect and circuit Twin-tub process layout design rules and latch-up, latch-up triggering and prevention.

Unit-IV

Circuit characterization and performance estimation resistance and capacitance estimation, Switching characteristics, CMOS gate transistor sizing, power dissipation. Basic physical design of simple logic gates. CMOS logic structure.

Unit-V

CMOS design methods. Design strategies. Programmable logic, programmable logic structure, reprogrammbale gate arrays. Exiling programmable gate array. Algotonix, concurrent logic, sea of gate and gate array design VHDL as a tool.

References:

- Neil, H.E. Wasdte, Kamran Eshraghian, Principles of CMOS VLSI design, Pearson Education.
- Wyne Wolf, Modern VLSI Design-system on silicon, PHI.
- Phillip E. Allen and Douglas R holding, CMOS Analog Circuit Design, 2nd edition, Oxford University press.

List of Experiments

1. Introduction to Tanner Tool 13.0 and its various domains.
2. Design CMOS Inverter using S-edit and getting its transient response.
3. Design Universal gates and all other gates using S-edit and getting its transient esponse.
4. Obtain the DC- characteristics of CMOS Inverter using DC-analysis.
5. Design Symbol of CMOS Inverter and using instances of its getting transient response.
6. Design Symbol of Universal gates and using instances of them getting transient esponse.
7. Design a Half Adder and Full adder using instances.
8. Design a Transmission gate using PMOS & NMOS by instance calling.
9. Introduction to Tanner L-edit.
10. Design the Layout of NMOS and PMOS transistor.
11. Design the Layout of CMOS Inverter.
12. Design the Layout of Universal gates.
13. Introduction to Hardware Description Language (HDLs).
14. Design all universal gates and flip-flops using different coding styles of VHDL.
15. Design a serial to parallel shift register using VHDL and download on FPGA kit.

PROGRAMME : BE Electronics & Instrumentation Engg., VII Semester

Course: EI702 Process Control

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 6C	THEORY PAPERS

	Process Control	EI702	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	2	

COURSE CONTENTS

Unit-I

Introduction: Historical Perspective, incentives of process control, synthesis of control system. Classification and definition of process variables.

Mathematical modeling: Need and application of mathematical modeling, Lumped and distributed parameters, Analogies, thermal, Electrical, and chemical systems, Modeling of CSTR, Modeling of heat exchanger, Interactive and non-interactive type of system, Dead time elements, Developing continuous time and discrete time models from process data.

Unit-II

Control Modes: Definition, Characteristics and comparison of on-off, proportional, Integral, Differential, PI,PD,PID, Dynamic behavior of feedback controlled processes for different control modes, Control system quality, IAE, ISE, IATE criterion, Tuning of controllers Ziegler-Nichols, Cohen-Coon Methods, controller trouble shooting..

Unit-III

Realization of Control Modes: Realization of different control modes like P, I, D in Electric, Pneumatic, Hydraulic controllers..

Unit-IV

Actuators: Hydraulic, Pneumatic actuators, Solenoid, E-P converters, control valves, Types, Functions, Quick opening, Linear and equal percentage valve, Ball valves, Butterfly valves, Globe valves, Pinch valves, valve application and selection, Cavitations and flashing, Dampers and variable speed Drives..

Unit-V

Advanced Controls: Introduction to advanced control system like Cascade , Feed forward, Ratio, Selective, Override, Split range and Auctioneering control, Plant wide control.

PI Diagrams: Symbols, Terminology, Case studies.

References:

- Dale Patrick, Stephen Fardo, "Industrial Process Control System".
- Shinskey F.G., "Process Control System", III Ed., McGraw Hill.
- Smith C.A. & A.B. Corripio, "Principle & Practiced Automatic Process Control", J. Willey.
- Rao M & S.Qiv, "Process Control Engg.", Gorden & Breach.
- GeorgeStephanopoulos " Chemical Process Control" PHI, Delhi
- C.D. Johnson "Process control instrumentation technology' PHI
- Harriott- Process Control 1st ed., TMH

- Patranabis- Principles of Process Control 2nd ed., TMH

List of Experiments

1. Designing of continuous electronics controllers, (P, I, D, PI, PD, PI D)
2. Study of Electro - Pneumatic Trainer kit and Pneumatic control valves.
3. Controlling of Temperature of water by continuous controllers (P, I, D, PI, PD, PI D).
4. Study of P to I converter and it's Interfacing to electro-pneumatic kit.
5. Study of I to P converter and it's Interfacing to electro-pneumatic kit.
6. Study of PLC and ladder diagram programming.
7. Controlling of flow meter through PLC.
8. Controlling of Bottling plant through PLC.
9. Controlling of Water level through PLC.
10. Implementation of traffic light control through PLC.
11. Controlling of stepper motor through PLC.
12. Study of rotary encoder and its controlling through PLC.

COURSE **PROGRAMME:** B.E. Electronics & Instrumentation Engg.,VII Semester

Course: EI703 Advanced Microprocessor and Microcontrollers

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDIT-6C			THEORY PAPER
			L	T	P	Max.Marks-100
	Advanced Microprocessor and Microcontrollers	*EI703*	3	1	2	Min.Marks-35 Duration-3hrs.

COURSE CONTENTS

Unit-I 16-bit microprocessor (one well known processor 8086), assembly language programming (8086 instruction set). Salient features of other processors (80286/386/486) and digital signal processors, I/O processor (8089). Arithmetic coprocessor: Architecture of 8087, interfacing with 8086, Data types, instructions.

Unit-II Architecture of 8-bit 8051 Micro controller, 8051 Assembly language programming and hardware interfacing: I/O port programming, interrupt programming, Bit manipulation, interfacing to LED, LCD, keyboard, ADC, DAC, Stepper motors and sensors.

Unit-III Overview of 16 bit 8096 microcontroller architecture. Types of Microcontrollers their Selection and Applications of Microcontrollers. RISC/CISC and Harvard/Princeton Architectures

Unit-IV ARM 32-Bit MCUs: Architecture, Programming, and Development Tools.

Unit-V Different Bus Configurations used for industrial automation - RS232, UART, SPI, RS485, GPIB, CAN, USB, I2C.

References:

- D.V. Hall, Microprocessor and Interfacing 2E, Tata McGraw-Hill.
- K.J. Ayala, The 8051 microcontroller: Architecture, programming and applications, Penram Int.
- M.A. Mazidi & J. G. Mazidi. 8051 Microcontroller and Embedded Systems, Pearson Education.
- Hariprasad, Advanced Microprocessors, Scitech Pub., 2009
- Raj Kamal, The concepts and features of microcontrollers (68H11, 8051 & 8096), Wheeler publishing.
- Raj Kamal, Microcontrollers : Architecture, Programming, Interfacing and System Design, 1/e , Pearson Education.
- David Seal, ARM Architecture Reference Manual, 2nd Ed, Published 2001, Addison-Wesley
- Satish Shah, Microcontrollers MCS 51 Family & its variants. Oxford University 2010 Addison- I

List of Experiments:

1. Write an 8051 assembly/Embedded C language program to implement following:
    a. Perform internal RAM block transfer operation
    b. Arrange numbers in ascending/descending order.
    c. Implement Booth's algorithm.
    d. LCD and 4x4 keypad interfacing.
    e. Seven segment interfacing
    f. ADC/DAC interfacing
    g. Stepper motor interfacing
    h. Interrupts and Timers.
    i. Serial communication with PC.
    j. RTC interfacing
    k. Mini-Project: Temperature indicator
2. Write ARM microcontroller assembly language Program to implement following:
    a. Perform Basic mathematical operations
    b. Data transfer operation using register set and Internal RAM
    c. Obtain smallest/greatest number from a given series.
    d. Perform multiplication using shift add method
    e. Practice Load and Store Multiple instructions and analyze the effect on data throughput.
    f. Practice Thumb instructions.
    g. Blink LEDs connected at Port after a delay.
    h. Generate square wave over port pins.
3. Familiarization with Integrated Development Environment for Microcontroller systems.

PROGRAMME : BE Electronics & Instrumentation Engg.,VII Semester
Course: EI7101 Safety and Reliability Engineering

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 4C			THEORY PAPERS
	Safety and Reliability Engineering	EI 7101	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

Reliability and safety definitions, Risk factor, Classification of failures and protective measures. Safety measurement, Preliminary hazard analysis, Subsystem fault hazard analysis, Common mode failures, codes and standards for safety.

Unit-II

Reliability improvement

Redundancy element, Unit, and stand by optimization-cost trade off- Fault tree analysis-Constructions of Fault tree-Calculations of reliability from fault tree-reliability allocation-evaluation of reliability-test-O.C. curve specifying reliability acceptance test.

Unit-III

Definition of Quality-Quality control design-Product development cycle-Quality planning of manufacturing process-Process selection and control-Inspection and testing-Quality audit-Organizing for quality-Quality function-Quality engineering and quality control-Typical organization for quality : Small scale, Medium scale and Large scale organization.

Unit-IV

Distribution, Markov modeling, Stress-strength approach to reliability design, Relationship between MTBF, hazard rate, failure rate, reliability.

Unit-V

Redundancy techniques, examples from Electrical, Nuclear, Chemical and Process Engineering, Elementary Analysis and Estimation techniques.

References:

- Jurian J.M., "Quality V Control Handbook", McGraw Hill.
- Grant E.L., & Levenworth, "Statistical Quality Control", McGraw Hill.
- Geedenko B.V., "Mathematical Methods of Reliability Theory", Academic.
- Mann, Schafer R.E., & Singapurvala N.D., "Mehods for Statistical Analysis of Reliability and Life Date"
- Reigenbaum V., "Total Quality Control", McGraw Hill.
- Trylot J.R., "Quality Control Systems-Procedures for Planning Quality Programs".

PROGRAMME: B.E. Electronics and Instrumentation Engg., VII Semester
Course: EI7102 DATA ACQUISITION SYSTEMS

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDIT-4C			THEORY PAPER
	DATA ACQUISITION SYSTEMS	*EI7102*	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

Display System: Seven segment Dot matrix, Multiplexed, Code converter, LCD(construction, working and Programming Hitachi controller), Plasma and vapor displays.

Unit-II

Recorders: Galvanometric type, Null type, Potentiometer type, Strip Chart and circular chart type , Magnetic tape recorder-principle & operation, Digital tape recorders.

Unit-III

General Telemetric Systems: land line & RF telemetry, voltage, current and Position telemetry with feedback mechanism, RF telemetry, Amplitude modulation , Frequency modulation , Pulse modulation-pulse amplitude modulation, pulse code modulation, wire ine and radio channels, Microwave channels, Radio ink, Transmitting and receiving antenna, telemetry with time and frequency division multiplexing, telemetry hardware, band width and Noise reduction(interference, Grounding, shielding, Guarding).

Unit-IV

Data transfer techniques: DMA controller and data transfer in DMA mode, Serial data transmission method and standards, 4-20 mA current loop, RS-232C: specifications connection and timing , RS-422,RS-423, GPIB/IEEE-488 standard digital interface, parallel communication, Centronix port, communication protocols, Local Area networks, Firewire, Universal serial bus, HART protocol, Foundation – Fieldbus, ModBus, TCP/IP, Data compression, Encryption, Error detection & correction techniques, Optical disk storage.

Unit-V

Data Acquisition System(DAS): single channel and multi channel, data conversion, Super Visory control and data acquisition system(SCADA), data acquisition system around microprocessor, micro controller & PC.

References:

1. Mathivanan N “Microprocessor PC Hardware and interfacing”, PHI, New delhi
2. H S Kalsi “ Electronic Instrumentation” TMH, New delhi
3. Patranabis- Principles of Industrial Instrumentation 3rd Ed., TMH
4. Singh- Industrial Instrumentation & Control 3rd ed., TMH

PROGRAMME: B.E. Electronics and Instrumentation Engg.,VII Semester

Course: EI7103 Management Information System (MIS)

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 4C			THEORY PAPERS
	Management Information System (MIS)	EI7103	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

The meaning and role of MIS

What is MIS, Decision support systems, systems approach, The systems view of business, MIS organization within the Company. Management organizational theory and the systems approach:

Development of organizational theory, Management and organizational behavior, Management information and the systems approach.

Unit-II

Information systems for decision-making:

Evolution of an information system, Basic information systems, Decision making and MIS, MIS as echnique for making programmed decisions, design assisting information systems. Strategic and project planning for MIS General business planning, appropriate MIS response, MIS planning-general, MIS planning-details.

Unit-III

Conceptual System Design

Define the problems, Systems objectives, Establish system constraints, Determine information needs, Determine information sources, Develop alternative conceptual designs and select one, Document the system concept, Prepare the conceptual design report.

Detailed System Design

Information and involve the organization, arm of detailed design, Project management of MIS detailed design. Identify dominant and trade off criteria define the subsystems, Sketch the detailed operating MIS systems and information flows, Determine the degree of automation of each operation, inform and involve the organization again, Inputs, Outputs and processing, early system testing, Software, Hardware and tools, propose an organization to operate the system, Document the detailed design., Revisit the manager user.

Unit-IV

Implementation, Evaluation and Maintenance of the MIS

Plan the implementation, Acquire floor space and plan space layouts organized for implementation, Develop procedures for implementation, Train the operating personnel, Computer related acquisitions, Develop forms for data collection and information dissemination, Develop the files, Test the system, Cut over, Document the system, Evaluate the MIS, Control and maintain the system.

Unit-V

Pitfalls in MIS Development

Fundamental weaknesses, Soft spots in planning, Design problem, Implementation the TAR PITF.

References:

- Murdick R.G., Russ J.B., Clagget J.R., Information Systems for modern management.
- Effy OZ, Management Information Systems, 3rd edition, Thomson.
- Jawadekar W.S., Management Information System.
- Brien J.A.O., Irwin, Management Information Systems, McGraw Hill.
- Dour's G.B., Olson M.H., Management Information Systems, 2nd edition, McGraw Hill.
- Thireramp R.J., Decision Support Systems for Effective Planning and Control, PHI.
- Sadagopan S., Management Information Systems, 4th edition, Prentice-Hall of India

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 4C			THEORY PAPERS
	Advanced DSP	EI 7104	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

1. Fundamentals of multirate systems, decimation, interpolation, aliasing, imaging, single stage and multistage implementation, polyphase representation, anti-alias and anti-image filters.
2. Filterbanks: Introduction, analysis and synthesis filter abnks, two-channel QMF, M-channel filterbanks, Tree structured filterbanks, polyphase representation.
3. Cosine modulated filter banks, near perfect and perfect reconstruction, pseudo QMF bank, polyphase structure.
4. Design of cosine modulated filterbanks, paraunitary filterbanks.
5. Quantization effects: Types of quantization effects, standard techniques, noise in filterbanks, coding gain, sub-band coding.

References:

- Multirate systems and filterbanks, P.P. Vaidyanathan, Preason Edu.
- Digital signal processing: A computer based approach, S.K. Mitra, TMH.
- Multirate digital signal processing, N.J. Fliege., John Wiley.
- Multirate Digital Signal Processing, Crochiere and Rabiner., PHI.

PROGRAMME: *B.E. Electronic and Instrumentation Engg., VIII-Semester*

Course: EI7201 Artificial Intelligence & Expert Systems

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDIT-6C			THEORY PAPER
	Artificial Intelligence & Expert Systems	EI7201	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

Basic Problem solving methods: Production systems-state space search, control strategies, Heuristic search, forward and backward reasoning, Hill climbing techniques, Breadth first search, Depth first search, Best search, staged search.

Unit-II

Knowledge Representation: Predicate logic, Resolution question Answering, Nonmonotonic Reasoning, statistical and probabilistic reasoning, Semantic Nets, Conceptual Dependency, frames and scripts.

Unit-III

AI languages: Important characteristics of AI languages - PROLOG, LISP.

Unit -IV

Introduction to Expert Systems: Structure of an Expert system interaction with an expert, Design of an Expert system.

Unit-V

Fundamentals of Artificial Neural Network (ANN), perceptrons, Back propagation, Cohenon self organizing network, Hop field networks

References:

- Rich E and Knight K, Artificial Intelligence, TMH New Delhi.
- Nelsson N.J., Principles of Artificial Intelligence, Springer Verlag, Berlin.
- Barr A, Fergenbaub E.A. and Cohen PR. Artificial Intelligence, Addison Wesley, Reading
- Waterman D.A., A guide to Expertsystem, Adision - Wesley, Reading
- Artificial Intelligence Hand book, Vol. 1-2, ISA, Research Triangle Park.
- Kos Ko B, Neural Networks and Fuzzy system –PHI.
- Haykin S, Artificial Neural Networks-Comprehensive Foundation, Asea, Pearson.

PROGRAMME: B.E. Electronics & Instrumentation Engg.,VII Semester

Course: EI7202 Environmental Instrumentation

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 4C			THEORY PAPERS
	Environmental Instrumentation	EI 7202	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

Characterization of waste and sources of pollution. Effects of pollution-ecological balance, Quality Standards and legislation.

Unit-II

Air pollution: Emission intensity and dispersion measurement and analysis techniques Photometric, Gas chromatography, and Mass Spectroscopic analysis. Dust Collectors, Colorimetry and radioactivity detectors. Trace element detectors, Continuous pollution monitoring. Control of Air Pollution and control instrumentation.

Unit-III

Water Pollution: Effluents and their characterization, Concentration and Separation methods of measurement and analysis. Waste treatment by Biological, Physical and Chemical (Aeration, Sedimentation, Flotation Coagulation, Ion-exchange, Aerobic and Anaerobic digestion) process control and Instrumentation. Colorimetry and Spectroscopic remote sensing techniques and instrumentation.

Unit-IV

Land Pollution: Instrumentation in sludge handling radioactive waste disposal and safety instrumentation. Soil Characteristic and fertility conservation.

Instrumentation for Noise and Thermal Pollution monitoring.

Unit-V

Control Instrumentation of Specific Industrial pollution in Steels, Paper, Cement, Power and Petro-chemical Plants.

References:

- Bond. R.G., C.P. Straub, Handbook of Environmental Control, Volume II.
- Jones Instrumentations series.

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDITS - 4C			THEORY PAPERS
	Bio Medical digital Signal Processing	EI 7203	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

Course Contents

Unit-I

Introduction: Origin of Bio electric signals and their characteristics. Noise coupling, powerline and other interfering sources, Artifacts, Analysis of concurrent, coupled and correlated processes.

Unit-II

Filtering techniques for removal of noise, artifacts and interferences. Design of Time domain and frequency domain filter. Optimal and Adaptive filtering techniques.

Unit-III

Detection of events in Bioelectric signals like ECG, EEG, PCG, etc. Detection of waves, correlation & coherence analysis, Few case studies.

Unit-IV

Wave shape & envelope extraction analysis. Processing of event related potentials. DSP techniques for Bio medical signals.

Unit-V

Frequency domain characterization, The Fourier spectrum, Estimation of the power spectral density function, Measures derived from PSD's. The short time Fourier transform and wavelet basics with application to Bio signals.

Reference:

1. Reddy- Biomedical Signal Processing: Principles and Techniques 1st ed., TMH

CATEGORY OF COURSE	COURSE TITLE	COURSE CODE	CREDIT-4C			THEORY PAPER
	Total Quality Management	*EI7204*	L	T	P	Max.Marks-100 Min.Marks-35 Duration-3hrs.
			3	1	0	

COURSE CONTENTS

Unit-I

Quality Concepts And Management

Evolution of quality control, Quality journey : Inspection to TQM, Quality of design, conformance, performance, functions, Global scenario, concept of Quality costs.

Unit-II

Standardization and Quality Assurance

Quality assurance: Concept, need; ISO 9000 systems, ISO 14000; Quality audit, documentation.

Unit-III

Statistical Quality Control

Basic statistical concepts, Probability distribution-Binomial, Poisson and Normal, control chars for variables and attributes, CUSUM charts, Multivariate charts, Process capability, Tolerances and selective assembly, Acceptance sampling.

Unit-IV

Diagnosis and Prevention of Defects

Defect study, Identification and analysis of defects, Corrective measure, Factors affecting reliability, MTBF, MTTR, Calculation of reliability, Building reliability in the product, Evaluation of reliability, Interpretation of test results, Reliability control, Maintainability, FMEA, Guarantee, Warrantee and claims.

Unit-V

Quality Awards

Break through in quality management, Quality gurus: Deming, Crosby, Ishikawa, Juran etc., Seven quality tools, Quality circle, Kaizen, Concepts of poka yoke, 5 S campaign, Six sigma, Qquality function deployment, Benchmarking, National quality award model; Malcom Balbridge, National Quality Awards , Quality in service sector, Administration etc., Case Studies.

References:

- Lt. Gen. H. Lal, "Total Quality Management", Wiley Eastern Limited.
- Greg Bounds, : Beyond Total Quality Management", McGraw Hill.
- Besterfield, Total Quality Management, Pearson Education, Asia.

- Menon, H.G., “TQM in New Product Manufacturing”, McGraw Hill.
- Mitra, Total Quality Control, Pearson Publication.
- Quality assurance and TQM by K.C. Jain and A.K. Chitale.