JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(Established by Govt. of A.P., Act. No. 30 of 2008)

ANANTHAPURAMU – 515 002 (A.P.) INDIA.

Course Structure for B.Tech-R15 Regulations

ELECTRONICS & INSTRUMENTATION ENGINEERING

B.Tech III-I Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A52301	Managerial Economics and Financial Analysis	3	1	-	3
2.	15A04503	Linear Integrated Circuits and Applications	3	1	-	3
3.	15A10501	Digital IC Applications	3	1	-	3
4.	15A10502	Virtual Instrumentation	3	1	-	3
5.	15A10503	Electronic Measurements and Instrumentation	3	1	-	3
6.	15A05402 15A12401	**MOOCS-I** a. Computer Organization b. Operating Systems	3	1	-	3
7.	15A10504	Linear and Digital IC Applications Laboratory	-	-	4	2
8.	15A10505	Virtual Instrumentation Laboratory	-	-	4	2
9.	15A99501	Audit course -Social Values & Ethics	2	0	2	0
		Total:	**20**	**06**	**10**	**22**

*Either by MOOCS manner or Conventional manner

B.Tech III-II Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A10601	Analytical Instrumentation	3	1	-	3
2.	15A04601	Microprocessors and Microcontrollers	3	1	-	3
3.	15A10602	Process Control	3	1	-	3
4.	15A10603	Power Plant Instrumentation	3	1	-	3
5.	15A10604	Industrial Instrumentation	3	1	-	3
6.	 15A04603 15A10605 15A10606 15A01608	**CBCC-I** a. Digital Signal Processing b. PC based Instrumentation c. Automotive Electronics d. Intellectual Property Rights	3	1	-	3
7.	15A10607	Process Control Laboratory	-	-	4	2
8.	15A10608	Analytical Instrumentation Laboratory	-	-	4	2
9.	15A52602	Advanced English Language Communicatior (AELCS) Laboratory (Audit Course)	-	-	2	-
10.	15A10609	Comprehensive Online Examination-II	-	-	-	1
		Total:	**18**	**06**	**12**	**23**

B.Tech IV-I Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A52601	Management Science	3	1	-	3
2.	15A10701	PLC and SCADA	3	1	-	3
3.	15A04702	Embedded Systems	3	1	-	3
4.	15A10702	Biomedical Instrumentation	3	1	-	3
5.	 15A04604 15A10703 15A10704	**CBCC - II** a. VLSI Design b. Opto Electronics and LASER Instrumentation c. Digital Control Systems	3	1	-	3
6.	 15A10705 15A10706 15A10707	**CBCC - III** a. Industrial Safety and Management b. System Design using Microcontrollers c. Telemetry and Telecontrol	3	1	-	3
7.	15A10708	PLC Laboratory	-	-	4	2
8.	15A10709	Microprocessors and Embedded Systems Laboratory	-	-	4	2
		Total:	**18**	**06**	**08**	**22**

B.Tech IV-II Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A10801 15A10802	**MOOCS-II** a. Digital Image Processing b. MEMS and Its Applications	3	1	-	3
2.	15A10803 15A10804	**MOOCS-III** a. Mechatronics for Instrumentation b. JAVA Programming	3	1	-	3
3.	15A10805	Comprehensive Viva Voce	-	-	4	2
4.	15A10806	Technical Seminar	-	-	4	2
5.	15A10807	Project Work	-	-	24	12
		Total:	**6**	**02**	**32**	**22**

2 Theory + 1 Comprehensive Viva voce + 1 Technical Seminar + 1 Project work
*Either by MOOCS manner or Self study or Conventional manner

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B. Tech III-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A52301 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I:

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. **Demand Analysis**: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

UNIT II:

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

UNIT III:

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV:

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

UNIT V:

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Course Outcome: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

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B. Tech III-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A04503 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Course Objectives:

- Design of OPAMPS, Classification of OPAMPs.
- To study and design various linear applications of OPAMPs.
- To study and design various non linear applications of OPAMPs

Course Outcomes:

- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyze the linear, non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.
- Realize the importance of Operational Amplifier.

UNIT – I

Differential Amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.

Operational amplifiers: Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve, open loop op-amp configurations. Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT-II

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, closed loop frequency response, circuit stability, slew rate.

UNIT-III

DC and AC amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas biquad filter.

UNIT-IV

Oscillators, Phase shift and wein bridge oscillators, Square, triangular and sawtooth wave generators, Comparators, zero crossing detector, Schmitt trigger, characteristics and limitations.

Specialized applications: 555 timer IC (monostable&astable operation) & its applications, PLL, operating principles, Monolithic PLL, applications, analog multiplier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type – Single Slope type – Dual Slope type – A/D Converter using Voltage-to-Time Conversion – Over-sampling A/D Converters,

TEXT BOOKS:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 2nd Edition, 2003.
2. K.LalKishore,"Operational Amplifiers and Linear Integrated Circuits", Pearson Education,2007.

REFERENCES:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th edition, 1987.
2. R.F.Coughlin& Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6th Edition, PHI.
3. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.

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B. Tech III-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A10501 DIGITAL IC APPLICATIONS

UNIT I

CMOS LOGIC& BIPOLAR LOGIC AND INTERFACING: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families. Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT II

THE VHDL HARDWARE DESCRIPTION LANGUAGE: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

THE VHDL DESIGN ELEMENTS: Structural design elements, data flow design elements, behavioral design elements, Time dimension and simulation synthesis.

UNIT III

COMBINATIONAL LOGIC DESIGN: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL modes for the above ICs.Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT IV

SEQUENTIAL LOGIC DESIGN: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT V:

Memory Design using VHDL

ROMs: Internal structure, 2D-decoding commercial types, timing and applications.

Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.

Dynamic RAM: Internal structure, timing, synchronous DRAMs, Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

REFERENCES:

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.
2. Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.

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L	T	P	C
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15A10502 VIRTUAL INSTRUMENTATION

Course Objective:

1. To understand what is Virtual instrumentation and to realize the architecture of VI.
2. To familiarize with the VI software and learn programming in VI.
3. To study various Instrument Interfacing and data acquisition methods.
4. To understand various analysis tools and develop programs for Process control applications.

Course Outcome:

Enable students to understand basics, programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

UNIT I

REVIEW OF VIRTUAL INSTRUMENTATION Historical perspective – Need of VI – Advantages of VI – Define VI – Block diagram & Architecture of VI – Data flow techniques – Graphical programming in data flow – Comparison with conventional programming.

UNIT II

PROGRAMMING TECHNIQUES: VI's and sub-VI's – Loops and charts – Arrays – Clusters – Graphs – Case & sequence structures – Formula nodes – Local and global variable – String & file input.

UNIT III

DATA ACQUISITION BASICS : DIO -Counters and timers – PC Hardware structure – Timing – Interrupts – DMA – Software and Hardware Installation – GPIB/IEEE 488 concepts – Embedded system buses – PCI – EISA – CPCI.

UNIT IV

COMMON INSTRUMENT INTERFACES : Current loop – RS 232C/RS 485 – Interface basics: USB – PCMCIA – VXI – SCXI – PXI – networking basics for office and industrial application VISA and IVI – Image acquisition and processing – Motion Control – DMM – Waveform generator.

UNIT V

USE OF ANALYSIS TOOLS AND APPLICATION OF VI: Fourier transforms – Power spectrum – Correlation methods – Windowing and flittering – Pressure control system – Flow control system – Level control system– Temperature data acquisition system – Motion control employing stepper motor – PID controller tool box.

TEXT BOOKS

1. Dr. Sumathi. S and Prof. Surekha. P, "LabVIEW Based Advanced nstrumentation Systems", 2nd edition, 2007.
2. Gary Johnson, "LabVIEW Graphical Programming", McGraw Hill, 2006.

REFERENCES

1. Lisa .K, Wells and Jeffrey Travis, "LABVIEW for Everyone", Prentice Hall, 2009.
2. Skolkoff, "Basic concepts of LABVIEW 4", PHI, 1998.
3. Gupta. S, Gupta. J.P, "PC Interfacing for Data Acquisition and Process Control", ISA, 1994. 4. Amy. L.T, "Automation System for Control and Data Acquisition", ISA, 1992.

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L	T	P	C
3	1	0	3

15A10503 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Course Objective: *To provide the knowledge required to understand and analyze the Instruments used for measurement of various electrical parameters*

Course Outcome:

The student is expected to apply the knowledge that they acquired during their course in EDC, ECA and PDC to study and design electronic instruments.

UNIT 1

SINE-WAVE, SQUARE-WAVE AND PULSE TESTING OF LINEAR SYSTEMS

Mathematical Background, Gain or Loss Measurement, The Measurement of Phase, Automatic Network Analyzers, Measurement of Delay Distortion, The Measurement of Loop Gain, The Measurement of Nonlinearity, Precautions in Sine-wave Testing.Tools and Techniques, Relations between Transient and Sinusoidal Responses, Response to Generalized Inputs, Effect of Low-end Cutoffs on Square-wave Response, Time-domain Reflectometry.

UNIT II

DIRECT-CURRENT INSTRUMENT AMPLIFIERS

Direct-current Amplifier Considerations, Direct-current Amplifier with Automatic Reset, Differential Amplifiers, Chopper Amplifiers.

UNIT III

VOLTAGE AND CURRENT MEASUREMENTS

Introduction to DVMs, Non-integrating Types of DVMs, Digital Voltmeters with Counting Circuitry, Normal-mode Rejection, Common-mode Rejection, Principles of AC Voltage Measurements, Average-responding Detectors, Peak-responding Detectors, Peak-to-peak Detection, Root-mean-square— responding Detectors, Other Detection Methods, Sampling Voltmeters, Synchronous Detection, Direct-current Probes, Alternating-current Probe

UNIT IV

IMPEDANCE MEASUREMENT

Definitions and Formulas, Components and Standards –Resistors, Capacitors, Inductors, Meter Methods to Measure Impedance -Direct—current meter, Capacitance and Inductance Meters, Complex Impedance Meters, Resistance and Impedance Comparators, Direct-current Bridges-The Wheatstone Bridge, Measurement of Low-valued Resistors, Measurement of High-valued Resistance

UNIT V

BRIDGES, TRANSMITTERS AND RECEIVERS

Low-frequency Bridges- General, Classification of Four-arm Bridges, Bridges with Inductively Coupled Ratio Arms, Special-purpose Bridges, Automatic and Semiautomatic Bridges, Radio-frequency Impedance Measurements, Problems at Radio Frequency, Radio-frequency Bridges, T Networks, Resonance Methods, The RF Meter Methods, Precision Measurements- Standardization of Impedance Unit, Methods of Precision Measurements.

General-performance Characteristics, Basic Measurements, Special System Measurements, Measurements on Receiving Systems, Sensitivity, Modulation-acceptance Bandwidth, Correlation of Sensitivity with Noise Figure, Automatic-gain-control Characteristics, Measurements on Transmitting Systems, Radio Equipment Specifications, Microwave Transistor Oscillators, Solid-state Microwave Amplifiers, Other Solid-state Microwave Sources.

Text Books:

1. Electronic Measurement and Instrumentation –Oliver and Cage –TMH.
2. Electronic Instrumentation and Measurements - David A. Bell—Oxford- 2nd Edition.

Reference Books:

1. Principles of measurement systems, John P. Bentley: 3rd edition, Addison Wesley Longman, 2000.
2. Measuring Systems, Application and Design by E.O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements by Shawney, Khanna Publ.
4. Electronic Instrumentation and measurements by David A. Bell, 2nd Edition, PHI, 2003.
5. Electronic instruments and instrumentation Technology by M.M.S. Anand: Prentice-Hall of India,2004.

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L	T	P	C
3	1	0	3

15A05402 COMPUTER ORGANIZATION
(MOOCS-I)

Course Objectives:

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

Course Outcomes:

- Ability to use memory and I/O devices effectively
- Able to explore the hardware requirements for cache memory and virtual memory
- Ability to design algorithms to exploit pipelining and multiprocessors

Unit I:

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.
Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Unit II:

Arithmetic: Addition and Subtraction of Signed Numbers, Design and Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.
Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

Unit III:

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

Unit IV:

Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

Unit V:

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose, Interconnection Networks.

Textbook:

1) "Computer Organization", Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill Education, 5th Edition, 2013**.**

Reference Textbooks:

1. Computer System Architecture, M.Morris Mano, Pearson Education, 3rd Edition.
2. Computer Organization and Architecture, Themes and Variations, Alan Clements, CENGAGE Learning.
3. Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill Education.
4. Computer Architecture and Organization, John P.Hayes, McGraw Hill Education.

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B. Tech III-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A12401 OPERATING SYSTEMS (MOOCS-I)

Course Objective:

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications.

Course Outcome:

- Able to use operating systems effectively.
- Write System and application programs to exploit operating system functionality.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley , Eight Edition, 2014.

Reference Books:

1. Operating systems by A K Sharma, Universities Press,
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
9. Operating System Desgin, Douglas Comer, CRC Press, 2nd Edition.

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B. Tech III-I Sem. (EIE)

L	T	P	C
0	0	4	2

15A10504 LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

Course Objective:
To provide exposure to the student about use of Linear and Digital Integrated Circuits

Course Outcome:
The student will be able to use Linear and Digital Integrated Circuits for different practical applications

Minimum Twelve Experiments to be conducted:

Part A (IC Application Lab):

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order).
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

Part B (ECAD Lab):

Simulate the internal structure of the following Digital ICs using VHDL / VERILOG and verify the operations of the Digital ICs (Hardware) in the Laboratory

1. Logic Gates- 74XX.
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple Carry Adder.
3. 3-8 Decoder -74138 & 8-3 Encoder- 74X148
4. 8 x 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4 bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.
9. Universal shift register -74X194.

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components: - IC741, IC555, IC566, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

For Software Simulation

1. Computer Systems
2. LAN Connections (Optional)
3. Operating Systems
4. VHDL/ VERILOG
5. FPGAS/CPLDS (Download Tools)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-I Sem. (EIE)

L	T	P	C
0	0	4	2

15A10505 VIRTUAL INSTRUMENTATION LABORATORY

Course Objective:

1. To familiarize with the VI software and learn programming in VI.
2. To experiment various functions available in LabVIEW.
3. To practice various Instrument Interfacing and data acquisition methods.

Course Outcome:

To get practical knowledge in programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

Experiments are to be performed using LAB VIEW Software
(Minimum TEN experiments should be performed)
LIST OF EXPERIMENTS

1. Verification of Arithmetic Operations.
2. Verification of Half Adder and Full adder.
3. Program to find Addition of First n natural numbers using for and while loop.
4. Implementation of Array functions.
5. Program for implementing Seven segment display.
6. Program to perform Traffic light control.
7. Calculation of BMI using cluster.
8. Program to control Temperature by using RTD and DAQ .
9. Program to control Temperature by using Thermocouple and DAQ
10. Program to control Temperature by using Thermister and DAQ
11. Program for controlling the Flow of water using DAQ.
12. Program for controlling the Level of water using DAQ.
13. Program for Pressure control using DAQ.
14. Program for controlling the speed of a DC motor using PID tool box

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-I Sem. (EIE)

L	T	P	C
2	0	2	0

15A99501 SOCIAL VALUES & ETHICS (AUDIT COURSE)

(Common to all Branches)

UNIT - I

Introduction and Basic Concepts of Society: Family and Society: Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

Channels of Youth Moments for National Building: NSS & NCC: History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):** Activities – Socio Cultural and Sports.

UNIT – II

Activities of NSS, NCC, NYK:

Citizenship: Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

Youth and Crime: Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

UNIT – III

Environment Issues: Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

Health, Hygiene & Sanitation: Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

Disaster Management: Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

Civil/ Self Defense: Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

UNIT – IV

Gender Sensitization: Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

UNIT - V

Physical Education : Games & Sports: Health and Recreation – Biolagical basis of Physical activity – benefiets of exercise – Physical, Psychological, Social; Physiology of Musucular Activity, Respiration, Blood Circulation**.**

Yoga: Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

TEXT BOOKS:

1. NSS MANUAL
2. SOCIETY AND ENVIRONMENT: A.S.Chauha, Jain Brothers Publications, 6th Edition, 2006
3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House
4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications
5. HUMAN SOCIETY: Kingsley Davis, Macmillan
6. SOCIETY: Mac Iver D Page, Macmillan
7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos, Oxford University Press
8. CONSTITUTION OF INDIA: D.D.Basu, Lexis Nexis Butterworth Publishers
9. National Youth Policy 2014 (available on www.yas.nic.in)
10. TOWARS A WORLD OF EQUALS: A.Suneetha, Uma Bhrugudanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala, Deepa Streenivas and Susie Tharu
11. LIGHT ON YOGA : B.K.S.Iyengar, Penguin Random House Publishers

www.un.org
www.india.gov.in
www.yas.nic.in
http://www.who.int/countries/ind/en/
http://www.ndma.gov.in
http://ayush.gov.in/event/common-yoga-protocol-2016-0

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)

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15A10601 ANALYTICAL INSTRUMENTATION

Course Objective:

Provide a solid background in the fundamental concepts and methods of spectroscopy, chromatography & environmental pollution and an appreciation of issues in each of these fields in current research.

Course Outcome:

On successful completion of the module students will be able to:

- Acquire knowledge about the interaction of electromagnetic radiations with matter and apply analytical techniques to accurately determine the elements present in the given sample.
- Select Instrument for a particular analysis with come idea of its merits, demerits and limitations
- Learn specific technique employed for monitoring different pollutants in air and water.
- They can understand the applications and usage of chromatography in real time industrial environments

UNIT I

Electromagnetic radiation – different regions, their wavelengths, frequencies and energies - interaction of EM radiations with matter – atomic, molecular, electronic interaction - Basic principles of spectroscopy – emission and absorption ofradiations – resonance - radiation sources – dispersing and resolving techniques – detectors - typical atomic emission and absorption spectrographs in the UV and visible region.

UNIT II

Molecular spectra – electronic, vibrational and rotational energies and spectra characteristic bands of radicals, OH, CH, CO, etc., - IR absorption - spectroscopy – single and double beam spectrophotometers - instrumentation techniques for analyzing solid, liquid and gaseous samples – sample handling techniques.

UNIT III

Microwave spectroscopy – NMR, ESR and EPR spectroscopy – basic principles – instrumentation techniques and applications - principles of ion optics – ion sources – single focusing and double focusing mass spectrometers – principles and application

UNIT IV

Principles of X-ray fluorescence spectrometry and flame photometry – detection of Xrays and nuclear radiations – ionization chamber - proportional counter – GM counter - scintillation counter - solid state detector - gamma ray spectrometers – isotope dilution and tracer techniques for quantitative estimation and analysis.

UNIT V

Electrochemical methods – electrical conductivity of liquids conductivity and water purity – practical measurements and application – sulphur dioxide monitor – determination of pH – oxygen analyzers. Principles of gas and liquid chromatography – process chromatography– operation of typical process chromatography.

Text Books:

1. H.H. Willard, L.L. Merrit, J.A. Dean and F.A. Settle, Instrumental methods of Analysis, 6th edition - CBS Publishers and Distributers, 1986.
2. B.E.Noltingk (Edtr,) Jone‘s Instrument Technology, Vol. 2, Fourth Edition, Butterworths, 1986 (chapters 4 &5 for unit 5)

Reference Books:

1. D.A. Skoog and D.M. West, Principles of Instrumental Analysis, 2 nd edition, Holt-Saunders, 1980.

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15A04601 MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

- To understand the architecture of 8086 MICROPROCESSOR.
- To learn various 8086 Instruction set and Assembler Directives.
- To learn 8051 assembly Language programming

Course Outcomes:

After completion of this subject the students will be able to :

1. Do programming with 8086 microprocessors
2. Understand concepts of Intel x86 series of processors
3. Program MSP 430 for designing any basic Embedded System
4. Design and implement some specific real time applications Using MSP 430 low power microcontroller.

UNIT I

Introduction-8086 Architecture-Block Diagram, Register Organization, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagrams, Memory Segmentation, Interrupt structure of 8086 and Interrupt Vector Table. Memory organization and memory banks accessing.

UNIT II

Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives-Macros and Procedures.- Sorting, Multiplication, Division and multi byte arithmetic code conversion. String Manipulation instructions-Simple ALPs.

UNIT III

Low power RISC MSP430 – block diagram, features and architecture,Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, Addressing modes, Instruction set Memory address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT-IV

I/O ports pull up/down resistors concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.

Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT-V:

Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using CC3100

Text Books:

1. "Microprocessor and Microcontrollers", N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford Publishers. 1 st Edition, 2010
2. "The X86 Microprocessors , Architecture, Programming and Inerfacing" , Lyla B. Das, Pearson Publications, 2010
3. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition, 2008

References:

http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra-Low_Power_MCU_Training

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15A10602 PROCESS CONTROL

Course Objective:

To provide the students with the knowledge on process characteristics and different control schemes for different process

Course Outcome:

- To study the characteristics of various process characteristics
- To understand the functions of process Control elements
- To study the Characteristics of PID controller, Automanual transfer and tuning methods.
- To study the various control schemes.
- To understand the Multivariable Control

UNIT I

PROCESS CHARACTERISTICS: Terms and Objectives, Incentives for process Control – design aspects of a Process Control System- Classification of variables. Process Equation, Process variables, Degrees of freedom. Characteristics of liquid system, gas system, thermal system. Mathematical modelling of processes. Self regulating-Servo and Regulatory, Interacting and Non-Interacting process – inverse response.

UNIT II

PROCESS CONTROL ELEMENTS: Signal conversion - I/P, P/I Converters, Pneumatic and Electric actuators, Valve Positioner-Control Valve – Characteristics of Control Valves-Types of control valves-control valve sizing- cavitation and flashing. Dynamics of batch and Continuous process.

UNIT III

CONTROLLER: - Basic control actions – Discontinuous control mode, Continuous control mode- Proportional, Single speed floating, Integral and Derivative– Composite control modes – P+I, P+D and P+I+D control modes. Response of controller for different types of test inputs –Integral windup – Auto manual transfer. Selection of control mode for different processes – Typical control schemes for level flow, pressure and temperature.

CONTROLLER TUNING: – Zeigler and Nichols open and Closed loop methods, Performance indices–Based on evaluation criteria – ISE, IAE, ITAE.

UNIT IV

VARIOUS CONTROL SYSTEMS : Feed Forward Control ,Cascade control , Ratio control,Over ride control, Split range control , Selective control ,Adaptive control, Inferential control.

UNIT V

MULTIVARIABLE CONTROL: Introduction -Control loop interaction –motivation – general pairing problem- relative gain array-properties- application of RGA- RGA sensitivity zeros and performance limitation –scaling consideration-block diagram analysis- decoupling design of non interacting control loops Piping and Instrumentation Diagram, Instrument terms and Symbols. Introduction to Intelligent controllers.

Text Books:

1. C.Stephanopoulos, ―Chemical process control‖, Prentice Hall of India. 1998.
2. Singh, _ Process Control‖ PHI Learning, 2009

Reference Books:

1. D.P. Eckman, ―Automatic Process Control‖, Wiley Eastern Ltd., 1972.
2. D.R. Coughanowr, ―Process System Analysis and Control‖, Second Edition, McGraw Hill 1991.
3. K. Ogata, ―Modern Control Engineering‖, Prentice Hall of India, 1982.

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B. Tech III-II Sem. (EIE)

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15A10603 POWER PLANT INSTRUMENTATION

Course Objective:

Able to introduce various methods of power generation and specially provide the knowledge of instrumentation and control in thermal power plants.

Course Outcome:

Upon completion of this course the student shall be able to apply his knowledge and understand how instrumentation system designed for a power plant.

UNIT I
OVERVIEW OF POWER GENERATION

Brief survey of methods of power generation-Hydro, thermal, nuclear, solar, wind, ocean etc. Importance of Instrumentation and control in power generation, piping and instrumentation diagram, Cogeneration of power, Control Rooms.

UNIT II
BOILER MANAGEMENT SYSTEM

Building block for boiler, boiler feed water circulation, measurements in water circuits, boiler drum level control, superheated steam temperature control, steam pressure control, feed water treatment, air-fuel circuit, measurement of pressure temperature flow level in air fuel circuit, combustion control, furnace draft control, deaerator control.

UNIT III
TURBO SUPERVISORY SYSTEM

Principles of steam turbine and gas turbine, condenser vacuum control, inlet and outlet measurements, governors, gland steam exhaust pressure control, speed vibration shell temperature monitoring and control, lubricating oil temperature control, generator cooling.

UNIT IV
POWER PLANT MANAGEMENT

Introduction, Master Control, Combustion Process, Boiler Efficiency, Maintenance of Measuring Instruments, Intrinsic and Electrical Safety, Interlocks for Boiler Operation, Computer based Control and Data Logging Systems, Distributed Control Systems.

UNIT V

ANALYZERS IN POWER PLANTS

Impurities in raw water, fuel analyzers, pH meter, conductivity meter, chromatography, oxygen measurement in flue gas, measurement of exhaust gas temperature, carbon dioxide measurement, combustion analyzer , infrared flue gas analyzer, smoke detector, dust monitor, pollution monitoring instruments.

Text Books:

1. *Power Plant Instrumentation by K. Krishnaswamy, M. Ponni Bala, M. Ponni Bala PHI Learning Pvt. Ltd., 2011.*
2. *Modern Power station practice, vol. 6, Instrumentation, controls and testing, Pergamon press, Oxford, 1971.*

Reference Books:

1. *Power-Plant Control and Instrumentation: The Control of Boilers and Hrsg Systems, David Lindsey IET, 2000.*
2. *Pow Plant Engg, Nag, Tata McGraw-Hill Education, 07-Aug-2008.*

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L	T	P	C
3	1	0	3

15A10604 INDUSTRIAL INSTRUMENTATION

Course Objective:

To study the various parameter like vacuum, pressure, temperature, floe, level, force, torque, velocity torque, nuclear radiation, used in process industry, power plants manufacturing and automation plants.

Course Outcome:

Upon completion of the subject, the students shall be able to understand how the various process parameters are measured.

UNIT I

PRESSURE AND TEMPERATURE MEASUREMENT

Vacuum and low pressure measurement using Monometer, McLeod Gage, Knudsen Gage, Ionization Gases, Thermal conductivity. Pressure measurement using bourdon gages, capsule gages, bellows, pressure transmitter, dead weight tester, force balance, vibration cylinder, dual gage techniques, and calibration.

Temperature standards, fixed points, filled system thermometers, bimetallic thermometer, types of thermocouple, laws of thermocouples, cold junction compensation, RTD, 2wire,3wire, 4wire connections, thermistor and linearization, IC sensors, optical and radiation pyrometers, calibration.

UNIT II

FLOW AND LEVEL MEASUREMENT

Solid flow measurement, Flow equation, flow measurement in pipelines, liquid and gas rotameter, head type, positive displacement, vortex type, hotwire anemometer, electromagnetic type, ultrasonic type, laser Doppler velocimeter, mass flow meter, gas flow meter, selection criteria, calibration.

Solid level measurement, visual technique, float operated devices, displacer devices, pressure gage method, diaphragm type, differential pressure method, boiler drum level, electrical methods, conductive sensor, capacitive sensor, ultrasonic type, purging techniques.

UNIT III

FORCE AND TORQUE MEASUREMENT

Force measurement, different methods, gyroscopic method, vibrating wire sensor, strain gage type, calibration.

Definition of torque, different methods, dynamometer, gyroscope, calibration.

UNIT IV

VELOCITY AND ACCELERATION MEASUREMENT

Relative velocity, translational and rotational velocity measurement, velocity of rotating machinery, speed measurement using tachometer, electrical and magnetic types, revolution counter, proximity type, photo electric type, stroboscope. Acceleration-accelerometer- different types-measurement in rotating machinery- calibration.

UNIT V

OTHER MEASUREMENTS

Nuclear radiation fundamentals, radiation detector, sound level meter, microphone, hydrophone, humidity and moisture measurement, overview of density measurement, measurement of chemical composition, smoke measurement, pollution measurement, clean room and measurement of particles.

Text Books:

1. Measurement systems-Application and Design- by Doeblin, 4/e, McGraw Hill International, 1990.
2. Mechanical measurements by A.K Shawney, Khanna publishers.
3. Instrumentation by C.S.Rangan, Mani and Sharma, Tata McGraw Hill publishing.

Reference Books:

1. Process Instruments and Control Handbook by D.M Considine, 4/e, McGraw Hill International, 1993.
2. Mechanical and Industrial Measurements by R.K.Jain, Khanna Publishers, 1986.
3. Instrument Technology, vol,1 by E.B.Jones, Butterworths, 1981.

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15A04603 DIGITAL SIGNAL PROCESSING
(CBCC-I)

Course Objectives:

- Program a DSP chip to filter signals using either assembly language or a C compiler for the chip.
- Use Z transforms and discrete time Fourier transforms to analyze a digital system.

Course Outcomes:

At the end of the course, the student should be able to:

- Formulate engineering problems in terms of DSP tasks.
- Apply engineering problems solving strategies to DSP problems.
- Design and test DSP algorithms.
- Analyze digital and analog signals and systems.
- Analyze and compare different signal processing strategies.

UNIT-I

Review of discrete-time signals and systems – Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems. **Discrete Fourier Transform:** Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

UNIT-II

Efficient computation of the DFT – Direct computation of DFT, Divide and conquer approach to computation of DFT, Radix-2, Radix-4, and Split radix FFT algorithms, Implementation of FFT algorithms, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, A linear filtering approach to computation of the DFT- the Goertzel, and the Chirp-z transform algorithms, Quantization errors in the computation of DFT.

UNIT-III

Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel

form and Lattice structures, Conversion from Lattice structure to direct form, lattice – Ladder structure.

UNIT-IV

General considerations – Causality and its implications, Characteristics of practical Frequency Selective Filters, Design of Finite Impulse Response (FIR) filters – Symmetric and asymmetric FIR filters, Design of linear phase FIR filters using windows, Design of linear phase FIR filters by the frequency sampling method, Design of optimum equi-ripple linear phase FIR filters, Comparison of design methods for linear phase FIR filters, Design of Impulse Invariance Response (IIR) filters from analog filters – IIR filter design by approximation of derivatives, by Impulse invariance, and by bilinear transformation methods, Characteristics of commonly used analog filters, Design examples of both FIR and IIR filters, Frequency transformation in the analog and digital domains, Illustrative problems.

UNIT-V

Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.
2. Sanjit K Mitra, "Digital signal processing, A computer base approach," Tata McGraw Hill, 3rd edition, 2009.

REFERENCES:

1. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
2. B. P. Lathi, "Principles of Signal Processing and Linear Systems," Oxford Univ. Press, 2011.
3. Li Tan, Jean Jiang, "Digital Signal Processing, Fundamentals and Applications," Academic Press, Second Edition, 2013.

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15A10605 PC BASED INSTRUMENTATION
(CBCC-I)

Course Objective:

1. It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
2. Learn the process of collecting information/ data through PC from real world sources.
3. Learn remote and networked data acquisition and operating system.
4. Learn programmable logic controllers, and its application.

UNIT –I

Introduction to Computer Instrument Communication:

Personal Computer, Overview of operating System, I/O Ports, Plug-in-slots, PCI bus, Operators Interface. Computer Interfacing for Data Acquisition and Control – Interfacing Input Signals, Output system with continuous actuators. Data Acquisition and Control using Standard Cards: PC expansion systems, Plug-in Data Acquisition Boards; Transducer to Control room, Backplane bus – VXI.

UNIT –II

Programmable logic controller (PLC) basics:

Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.

Basic PLC programming:

Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

UNIT – III

PLC intermediate and advanced functions:

Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC

UNIT –IV

Application of PLC:

Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating.

UNIT – V

Related Topics:

Alternate programming languages. Auxiliary commands and functions. PLC installation, troubleshooting and maintenance. Field bus: Introduction, concept. HART protocol: Method of operation, structure, and applications. Smart transmitters, smart valves and smart actuators.

Text Books

1. *Programmable Logic Controllers – Principles and Applications, John. W .Webb Ronald A Reis , Fourth edition, Prentice Hall Inc., New Jersey, 1998.*
2. *Computer Control of Processes – M.Chidambaram. Narosa 2003*

References

1. PC Based Instrumentation and Control Third Edition by Mike Tooley ; Elsevier.
2. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control. By Kevin James; Elsevier.
3. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
4. Distributed Control Systems, Lukcas M.P, Van Nostrand Reinhold Co., New York, 1986. Programmable Logic Controllers, Second edition, Frank D. Petruzella, Mc Graw Hill, Newyork, 1997.
5. Programmable Logic Controllers Programming methods and applications- Prentice Hall by. John R. Hackworth and Frederick D. Hackworth, Jr.

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15A10606 AUTOMOTIVE ELECTRONICS
(CBCC-I)

***Course Objective**:*
To make the students to understand the basic principle of conventional automobile and its replacement by modern electronic system.

Course Outcome:
The students understand how the conventional automotive subsystems are replaced by modern electronic systems , their relative advantages and comfort.

UNIT I
INTRODUCTION TO AUTOMOTIVE INDUSTRY AND MODERN AUTOMOTIVE SYSTEMS
Vehicle classifications and specifications, Introduction to modern automotive systems and need for electronics in automobiles, Application areas of electronics in the automobiles, Sensors and actuators, Possibilities and challenges in the automotive industry, Enabling technologies and industry trends

UNIT II
SPARK AND COMPRESSION IGNITION ENGINES
Ignition systems, Fuel delivery systems, Engine control functions, Fuel control, Calculation of injector pulse width and injection strategies, Ignition timing control, Lambda control, Engine control modes, Engine control diagnostics

UNIT III
TRANSMISSION CONTROL, BRAKING AND ELECTRONIC STABILITY CONTROL
Automotive transmissions- Transmission fundamentals- Types- Components, Introduction to electronic transmission control- Shift point control- Lockup control-torque converter clutch- Engine torque control during shifting, Safety and diagnostic functions, Improvement of shift quality, vehicle braking fundamentals, Vehicle dynamics during

Braking, brake system components, introduction to antilock braking systems, components and control logic, electronic stability and other technologies

UNIT IV
STEERING CONTROL:
Steering system basics, fundamentals of electronically controlled power steering types, electronically controlled hydraulic system, electric power steering

UNIT V

AUTOMOTIVE ELECTRONICS FOR PASSENGER SAFETY AND CONVENIENCE

Air bag and seat belt pretension systems- sensor functions, distributed front air bag sensing systems-single-point sensing systems- side-impact sensing- future occupant protection systems, tire pressure monitoring systems, configuration of systems such as power seats-power windows-remote keyless entry systems, types of hybrid vehicles-configurations- main components of hybrid Vehicles.

Text Books:

1. *Tom Denton, ―Automobile Electrical and Electronics Systems‖, Edward Arnold Publishers, 2000.*
2. *William B. Ribbens, ―Understanding Automotive Electronics‖, 5th edition, Newnes Publishing, 2000.*

Reference Books:

1. *Barry Hollembeak, ―Automotive Electricity, Electronics & Computer Controls‖, Delmar Publishers, 2001.*
2. *Fuel System and Emission controls‖, Check Chart Publication, 2000.*
3. *Ronald. K. Jurgon, ―Automotive Electronics Handbook‖, McGraw-Hill, 1999.*

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15A01608 INTELLECTUAL PROPERTY RIGHTS
(CBCC-I)

COURSE OBJECTIVE:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.

UNIT – I

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

UNIT – II

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law. Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT – IV

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation. Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V

New Developments Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits. International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learing.
2. Intellectual Property Rights– Unleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,

Course Outcomes:

On completion of this course, the student will have an understanding of the following:

a) Intellectual Property Rights and what they mean
b) Trade Marks and Patents and how to register them
c) Laws Protecting the Trade Marks and Patents
d) *Copy Right and laws related to it.*

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15A10607 PROCESS CONTROL LABORATORY

Course Objective:
To understand practical aspect of process industries

Course Outcome:
Students can understand the closed loop control of various processes
Modeling of single capacity level process from experimental Reactive curve.

Obtain PID Turing parameters from the model.

1. Modeling of single capacity level process from experimental Reactive curve. Obtain PID Turing parameters from the model.
2. Modeling of Two capacity level process.
3. Modeling of two capacity interacting level process by semi log method.
4. Modeling of Thermal process from reaction curve and obtain tuning parameters from the model.
5. Modeling of Thermal process.
6. Closed loop control of flow process.
7. Closed loop control of level process.
8. Closed loop control of Thermal Process.
9. Closed loop control of Pressure process.
10. Inherent and Installed characteristic study of linear, equal percentage and quick opening valves.

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15A10608 ANALYTICAL INSTRUMENTATION LABORATORY

Course Objectives:

1. *Students will be introduced to modern analytical instruments with the goal of providing them with the tools.*
2. *The emphasis will be a "hands-on" approach with sample preparation, application, method development, data analysis and interpretation being key elements.*
3. *Interpret data derived from any analytical instruments.*

Course Outcomes:

1. *Apply basic lab safety rules while working in analytical instrumentation laboratories*
2. *Apply basic analytical processes and sampling procedures and perform them in the lab*
3. *Apply the basic principles of spectroscopy and work in real time with it.*
4. *Perform simple analytical procedures on given samples using Ultraviolet or Infrared Spectrophotometers leading to applied research.*

(Minimum 10 experiments should be completed)

1. Gas analyzers.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass spectrometer.
8. pH measurement.
9. Interfacing of ADC to PC and observe the data.
10. Interfacing of DAC to PC and generate various types of signals.
11. Serial communication through RS-232C between µCs / PCs.
12. Data transfer through IEEE-1394 (fireware) interface.
13. Data Acquisition System
14. Nuclear radiation detector.
15. Water Purity meter
16. Digital Conductivity meter
17. Digital Turbidity meter

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15A52602 ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB (Audit Course)

1. INTRODUCTION

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

2. COURSE OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

UNIT-I: COMMUNICATION SKILLS

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

UNIT-II: WRITING SKILLS

1. Report writing
2. Resume Preparation
3. E-mail Writing

UNIT-III: PRESENTATION SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation

UNIT-IV: GETTING READY FOR JOB

1. Debates
2. Group discussions
3. Job Interviews

UNIT-V: INTERPERSONAL SKILL

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

4. LEARNING OUTCOMES:

- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

5. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system

- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and G

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skillslab**
3. **DELTA's key to the Next Generation TOEFL Test: Advanced SkillsPractice.**
4. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. **Train2success.com**

7. BOOKS RECOMMENDED:

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 3rd Edn. 2015.
3. **Essay Writing for Exams, Audrone Raskauskiene, Irena Ragaisience & Ramute Zemaitience,OUP, 2016**
4. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate,** Gangadhar Joshi, Sage Publications, 2015
7. **Communicative English,**E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams,** Philip Sunil Solomon OUP, 2015

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15A52601 MANAGEMENT SCIENCE

Course Objective*: The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.*

UNIT –I

Introduction to Management: Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern management-Motivation Theories-Leadership Styles-Decision MakingProcess-Designing Organization Structure-Principles and Types of Organization.

UNIT- II

Operations Management: Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control-EOQ&ABC Analysis(Simple Problems)**Marketing Management:**

Meaning,Nature, Functions of Marketing, Marketing Mix, Channels of distribution-Advertisement and sales promotion-Marketing strategies-Product Life Cycle.

UNIT –III

Human Resource Management(HRM): Significant and Basic functions of HRM-Human Resource Planning(HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and Salary administration. Employee Training and development-Methods-Performance Appraisal-Employee Grievances-techniques of handling Grievances.

UNIT –IV

Strategic Management: Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strateg Formulation, Implementation and Evaluation. **Project Management**: Network Analysis-PERT, CPM, Identifying Critical Path-Probability-Project Cost Analysis, Project Crashing (Simple Problems).

UNIT-V

Contemporary Management Practices: Basic concepts of MIS-Materials Requirement Planning(MRP),Just-In-Time(JIT)System, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models(CMM) evies, Supply Chain Management, Enterprise Resource Planning(ERP),Performance Management, Business Process Outsourcing(BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

Course Outcome: This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient management decisions on physical and human resources of an organization. Beside the knowledge of Management Science facilitates for his/her personal and professional development.

TEXT BOOKS:

1. A.R Aryasri: Management Science, TMH, 2013
2. Kumar /Rao/Chalill 'Introduction to Management Science' Cengage, Delhi, 2012.

REFERENCE BOOKS:

1. A.K.Gupta "Engineering Management",S.CHAND, New Delhi, 2016.
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.
3. Kotler Philip & Keller Kevin Lane: Marketing Mangement , PHI,2013.
4. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
5. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
6. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
7. Parnell: Strategic Management, Biztantra, 2003.
8. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

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15A10701 PLC AND SCADA

Course Objective:

1. *To study the fundamentals of Data Acquisition system*
2. *To teach the concept of PLC and the Programming using Ladder Diagram*
3. *To understand the basics of SCADA and communication standards*

Course Outcome:

1. *Students will have the knowledge of data acquisition System*
2. *Students will be able to write Programs using ladder diagrams*
3. *Students will have the knowledge of SCADA, communication standards and various network protocol*

UNIT-I

INTRODUCTION TO PLC

Definition & History of PLC, Overall PLC system, PLC Input and Output modules, CPU & Programmer/Monitors, Solid state memory, the processor, Input Module (Interfaces), Power supplies, PLC advantages & disadvantages, selection criteria for PLC.

UNIT-II

PROGRAMMING OF PLC

Programming equipments, Proper construction of PLC ladder diagram, Basic components & their symbols in ladder diagram, Fundamentals of ladder diagram, Boolean logic & relay logic, and analysis of rungs. Input ON/OFF switching devices, Input analog devices, Output ON/OFF devices, Output analog devices, Programming ON/OFF Inputs to produce ON/OFF outputs. PLC timer function-PLC counter functions.

UNIT-III

INTRODUCTION TO SCADA

Introduction and brief history of SCADA, Fundamental principles of modern SCADA systems, SCADA hardware, SCADA software, Landlines for SCADA, Modern use in SCADA system, computer sites and troubleshooting, system implementation.

UNIT-IV

SCADA SYSTEM, HARDWARE AND FIRMWARE

Comparison of terms SCADA, Distributed Control Systems (DCS), PLC and smart instrument, considerations and benefits of SCADA system, Remote Terminal Units (RTUs): Control Processor, Analog input & output module, Digital input & output

module, communication Interfaces, Power supply module for RTU, Application program, PLC used as RTUs, Master station, System reliability and availability, communication architecture and philosophies.

UNIT-V

THE EVOLUTION OF SCADA PROTOCOLS

Overview of Open System Interconnection (OSI) Model, Functions of OSI Model Layers, OSI Protocols, Functions of Transmission Control Protocol/ Internet Protocol (TCP/IP), DNP3 Protocol, IEC61850 layered architecture, CIP protocol, DeviceNet, ControlNet, EtherNet/IP, Flexible Function Block Process (FFB), Process Field bus (profibus), The security Implications of SCADA protocols.

TEXT BOOKS

1. John W Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", Pearson Education, 5th Edition.
2. David Bailey, Edwin Wright, "Practical SCADA for Industry", Newns, An Imprint of Elsevier, 2003.

REFERENCES

1. Ronald L Krutz "Securing SCADA system", Wiley publishimg,2006
2. John R.Hackworth, FredrickD, Hackworth Jr., "Programmable Logic Controllers: Programming Methods and applications"
3. Gordan Clark, Deem Reynders, "Practical Modem SCADA Protocols"
4. Gary Dunning, "Introduction to Programmable Logic Controllers" , Thomson, 2nd Edition.

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15A04702 EMBEDDED SYSTEMS

Course Objectives:

- To understand the fundamental concepts of Embedded systems.
- To learn the kernel of RTOS, architecture of ARM processor.

Course Outcomes:
After completion the students will be able to

- Design of embedded systems leading to 32-bit application development.
- Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
- Review and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.
- Understand Embedded Networking and IoT concepts based upon connected MCUs

UNIT-I
Introduction to Embedded Systems
Embedded system introduction, host and target concept, embedded applications, features and architecture considerations for embedded systems- ROM, RAM, timers; data and address bus concept, Embedded Processor and their types, Memory types, overview of design process of embedded systems, programming languages and tools for embedded design

UNIT-II
Embedded processor architecture
CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Introduction to ARM architecture and Cortex – M series, Introduction to the TM4C family viz. TM4C123x & TM4C129x and its targeted applications. TM4C block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT- III
Overview of Microcontroller and Embedded Systems
Embedded hardware and various building blocks, Processor Selection for an Embedded System , Interfacing Processor, Memories and I/O Devices, I/O Devices and

I/O interfacing concepts, Timer and Counting Devices, Serial Communication and Advanced I/O, Buses between the Networked Multiple Devices.

Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System, Uses of Target System or its Emulator and In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System

Design metrics of embedded systems - low power, high performance, engineering cost, time-to-market.

UNIT-IV

Microcontroller fundamentals for basic programming

I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on TM4C, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

Unit-V

Embedded communications protocols and Internet of things

Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, Implementing and programming UART, SPI and I2C, SPI interface using TM4C. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices “Sensor Hub BoosterPack”

Embedded Networking fundamentals, IoT overview and architecture, Overview of wireless sensor networks and design examples. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API.

Case Study: Tiva based Embedded Networking Application: “Smart Plug with Remote Disconnect and Wi-Fi Connectivity”

Text Books:

1. Embedded Systems: Real-Time Interfacing to ARM Cortex-M Microcontrollers, 2014, Create space publications ISBN: 978-1463590154.
2. Embedded Systems: Introduction to ARM Cortex - M Microcontrollers, 5th edition
   Jonathan W Valvano, Createspace publications ISBN-13: 978-1477508992
3. Embedded Systems 2E Raj Kamal, Tata McGraw-Hill Education, 2011 ISBN-0070667640, 9780070667648

References:

1. http://processors.wiki.ti.com/index.php/Hands-On_Training_for_TI_Embedded_Processors
2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop
3. http://www.ti.com/ww/en/simplelink_embedded_wi-fi/home.html
4. CC3100/CC3200 SimpleLink™ Wi-Fi® Internet-on-a-Chip User Guide Texas Instruments Literature Number: SWRU368A April 2014–Revised August 2015.

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15A10702 BIOMEDICAL INSTRUMENTATION

Course Objective: *To learn the physiology of the human body and the Instrumentation related to Biomedical Systems.*

Course Outcome: *On successful completion of the module students will be able to:*
To introduce the concepts of physiology and the Electrical Components of a Biomedical System. To discuss the measurement of physiological parameters.
To understand the concepts of Imaging System and Telemetry ad the various Therapeutic Equipments used in Medicine.

UNIT I

ELECTRO PHYSIOLOGY: Review of Physiology and anatomy – sources of Bioelectric Potentials – Resting and Action Potentials – Propagation of Action Potentials – Electrodes theory – Bio potential electrodes – Bio chemical transducers – Transducers for Bio Medical applications.

UNIT II

BIOMEDICAL RECORDERS AND CARDIOVASCULAR MEASUREMENT: Physiology of cardiovascular and nervous system – ECE-EEE-EME – Foetal ECE-Phonocardiography –Vector Cardiography – Holtel monitoring – BP – Blood flow – cardiac output – ICCU – Bedside unit and central monitoring unit.

UNIT III

PULMONARY MEASUREMENT AND BIO TELEMETRY: Physiology of respiratory system –Respiratory rate measurement – wine and wireless Biotelemetry – Telemetering multiple information – implanted transmitters – sauces of electrical hazards and safety techniques.

UNIT IV

MEDICAL IMAGING SYSTEM: Ultrasound scanner – Echo cardiography – Coloar Doppler system – CAT and CT scan – MRI Imaging – Cine angiogram – LASER Imaging –Endoscope.

UNIT V

THERAPEUTIC UNITS: Physiotheraphy and Electrotheraphy - Short ware, Microwave diathermy –Defibrillators – Cardio vector – Hearing aid – dialysis machine.

Text Books:

1. *R.Anandanatarajan, —Biomedical Instrumentation‖, PHI Learning, 2011.*

Reference Books: .

1. *Leshie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, —Biomedical Instrumentation and Measurements‖, 2nd Edition, PHI, 2003.*
2. *R.S. Khandpar, —Hand Book of Biomedical Instrumentation and measurement‖, McGraw Hill publishing Co., 1990.*
3. *Aston, —Principles of Biomedical Instrumentation and measurements‖, McGraw Hill publishing Co., 1990.*

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15A04604 VLSI DESIGN
(CBCC-II)

Course Objectives:

- To understand VLSI circuit design processes.
- To understand basic circuit concepts and designing Arithmetic Building Blocks.
- To have an overview of Low power VLSI.

Course Outcomes:

- Complete Knowledge about Fabrication process of ICs
- Able to design VLSIcircuits as per specifications given.
- Capable of optimizingthe design of Arithmetic / logic building Blocks at all levels of Design/Fabrication.
- Can implement circuit through various design styles (semi- Custom, Full Custom)

UNIT-I

Introduction: Basic steps of IC fabrication, PMOS, NMOS, CMOS &BiCMOS,and SOI process technologies, MOS transistors - MOS transistor switches – Basic gate using switches, working polartransistor Resistors and Capacitors.

Basic Electrical Properties of MOS and BiCMOS Circuits: Working of MOS transistors – threshold voltage; MOS design equations: I_{ds}–V_{ds} relationships, Threshold Voltage, Body effect, Channel length modulation , g_m, g_{ds}, figure of merit ω_0; Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull ups loads, Bi-CMOS Inverters.

UNIT-II

Basic Circuit Concepts: Capacitance, resistance estimations- Sheet Resistance R_s, MOSDivice Capacitances, routing Capacitance, Analytic Inverter Delays, Driving large Capacitive Loads, Fan-in and fan-out.

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2µm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-III

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing

UNIT-IV

Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

Test and Testability: Fault-modeling and simulation, test generation, design for testability, Built-in-self-test.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2013 Edition.
2. K.Lal Kishore and V.S.V. Prabhakar, "VLSI Design", IK Publishers

REFERENCES:

1. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS layout and Simulation", Thomson Learning.
4. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John wiley, 2003.
5. John M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 1997.

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15A10703 OPTO ELECTRONICS & LASER INSTRUMENTATION (CBCC-II)

Course Objective:

To make the students understand the application of Opto Electronics and Lasers in instrumentation industries.

Course Outcome:

Upon completion of this course the student shall be able to apply his instrumentation knowledge and understand how light and LASER can be used for measurements.

UNIT I

OPTICAL FIBERS AND THEIR PROPERTIES

Introduction to optical fiber , fiber characteristics, principles of light propagation through a fiber, Different types of fibers and their properties, Losses in the optical fiber, Dispersion, advantages and limitations of optical fibers

UNIT II

OPTO-ELECTRONIC COMPONENTS

Optical sources- LED- LD, Optical detectors- PIN- APD, Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT III

INDUSTRIAL APPLICATIONS OF OPTICAL FIBERS

Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications

UNIT IV

LASER FUNDAMENTALS

Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Gas lasers, Solid lasers, Liquid lasers and Semiconductor lasers

UNIT V

INDUSTRIAL APPLICATIONS OF LASER

Industrial applications of lasers – Lasers for measurement of distance, length, velocity, acceleration, current, voltage. Bio-medical applications. Holography- Principle, Methods. Holographic Interferometers and applications.

Text Books:

1. *Optical Fiber Communication – Principles and Practice, J.M. Senior, , Prentice Hall of India, 1985.*
2. *Introduction to Opto Electronics, J. Wilson and J.F.B. Hawkes, Prentice Hall of India, 2001.*

Reference Books:

1. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
2. Optical Fibre Communication and Sensors, M. Arumugam,Anuradha Agencies, 2002.
3. 3.Optical Fibre Communication, G. Keiser, McGraw Hill, 1995.
4. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press Monte Ross, Laser Applications, McGraw Hill, 1968.

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B. Tech IV-I Sem. (EIE)

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15A10704 DIGITAL CONTROL SYSTEMS
(CBCC-II)

Course Objectives:

1. To equip the students with the basic knowledge of A/D and D/A conversion
2. To understand the basics of Z- Transform
3. To study the stability analysis of digital control system
4. To equip the basic knowledge of digital process control design

UNIT-I

Z-PLANE Analysis of Discrete-Time Control System

Introduction to Digital Control System, Review of Z-Transforms, Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane. Modified Z-Transforms.

UNIT – II

State Space Analysis

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT – III

Controllability and Observability

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

Stability analysis**-**Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stablility test – Stability Analysis by use of the Bilinear Transformation with Routh Stability criterion.

UNIT – IV

Design of Discrete Time Control System by Conventional Methods

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – V State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order, minimum order and Reduced order observers.

Text Books:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

References:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal

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15A10705 INDUSTRIAL SAFETY AND MANAGEMENT
(CBCC-III)

Course Objective:
To understand the importance of industrial safety

Course Outcome:
Students will acquire knowledge on the Industrial safety and management

UNIT I
Energy conversion – world fossil fuel reserves – world energy consumption – historical lives of fossil fuels – global energy and environmental management – environmental aspects of fossil, nuclear, hydro and biomass energy conversion – gaseous emissions – solid waste – liquid waste.

UNIT II
Energy management – need for energy conservation – energy auditing – conducting real time continuous energy audits – data collection – automated data acquisition – data analysis – role of energy manager – energy audit instruments – gas analyzer – energy conservation in industries: boilers, pumps, fans, compressed air systems, refrigeration and air conditioning systems, DG sets, electrical motors, variable speed motors.

UNIT III
Air pollutants and global climate – air pollutant effects. Pollution control laws and regulation –national and international – role of environmental monitoring in environmental management systems – continuous emissions monitoring systems. Pollution control – review of pollution control methods in thermal power plants – industrial – nuclear – automobiles – disposal/treatment of solid and liquid wastes – alternate fuels.

UNIT IV
Safety and productivity – causes of accidents in industries – accidents reporting and investigation –measuring safety performance – workman compensation rules.

UNIT V
Safety codes and standards – general safety considerations in power plants, pressure vessels and pressurized pipe lines – operation and inspection of extinguishers – preventing the spread of fire –emergency exit facilities.

Text Books:

1. Blake Roland. P, “Industrial safety”, Prentice Hall of India, 1973.
2. Callaghan. P. O, “Energy Management”, McGraw Hill Book Co., 1993.

Reference Books:

1. Culp. A. W, “Principles of Energy Conservation”, McGraw Hill Book Co., 1991.
2. Noel de Nervers, “Air Pollution Control Engineering”, McGraw Hill Book Co., 2000.

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15A10706 SYSTEM DESIGN USING MICROCONTROLLERS
(CBCC-III)

Course Objective:

- *To introduce system design concepts to students using microcontrollers with foundational concepts of microcontroller architecture and programming .*
- *To introduce hardware and software integration for real time systems using microcontrollers and thereby imparting real time system design knowledge to students.*

Course Outcome:

- *Foundational knowledge in activating and using a generic microcontroller. Preliminary design considerations for system level implementation.*
- *Knowledge of 8051 Microcontroller hardware features and internal peripherals.*
- *Programming knowledge of 8051 microcontrollers.*
- *Knowledge of PIC Microcontroller hardware features and internal peripherals.*
- *Programming knowledge of PIC microcontrollers.*
- *Software design techniques to be followed for embedded system designing.*
- *Using real time operating systems for embedded systems.*

UNIT I

REVIEW OF MICROCONTROLLERS: Features of Typical Microcontroller – on Board peripherals – Processor Selection criteria – Microcontroller Design Specifications – Word length – Performance Issues - Power consumption – Package Types – Electrical requirements – Reset Hardware – oscillator Design – power Consideration - Development Tools –Firmware Development options – Assembly Language Vs High level Language Programming.

UNIT II

MCS51 MICROCONTROLLER AND INTERFACING: Intel MCS51 Architecture – Derivatives - Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing ,Introduction to 16 bit Microcontroller

UNIT III

PIC MICROCONTROLLER AND INTERFACING: Introduction, CPU architecture,

registers, instruction sets addressing modes Loop timing, timers, Interrupts, Interrupt timing, I/O Expansion, I 2C Bus Operation Serial EEPROM, Analog to digital converter, UART-Baud Rate-Data Handling-Initialization, Special Features - serial Programming-Parallel Slave Port.

UNIT IV

SOFTWARE DEVELOPMENT AND TOOLS: Embedded system evolution trends. Round -Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms. Introduction to-assembler-compiler-cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT V

REAL TIME OPERATING SYSTEMS: Task and Task States, tasks and data, semaphores and shared Data Operating system Services-Message queues-Timer Function-Events-Memory
Management, Interrupt Routines in an RTOS environment, basic design Using RTOS. System Design Issues – Design of Industrial Control System.

Content beyond the Syllabus:

Introduction to ARM processors and programming NXP LPC2148 microcontroller.

Text Books:

1. *David E Simon, " An embedded software primer ", Pearson education Asia, 2001.*
2. *Mohammed Ali Mazidi and Janice Gillispie Mazidi, ―The 8051 Microcontroller and Embedded System‖, Pearson Education Asia, New Delhi, 2006.*

Reference Books:

1. *Burns, Alan and Wellings, Andy, " Real-Time Systems and Programming Languages ", Second Edition. Harlow: Addison-Wesley-Longman, 1997.*
2. *Raymond J.A. Bhur and Donald L.Bialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc. New Jersey, 1999.*
3. *Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development. Reading " Addison-Wesley-Longman, 1998.*

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15A10707 TELEMETRY & TELECONTROL
(CBCC-III)

Course Objective:

- *The subject Telemetry and Telecontrol enables the students to understand how various process parameters in the industry are transmitted and controlled from remote place.*

Course Outcome:

- *The students shall apply the knowledge of transducers, communications, optical communications and satellite communication in understanding the subject. The students understand how process industry and automation plants are controlled from remote place*

UNIT I

TELEMETRY PRINCIPLES

Introduction, Functional blocks of telemetry, Classification of telemetry, design factors considered in selection of telemetry, cable telemetry-2 wire-3 wire-4 wire, pneumatic telemetry, hydraulic telemetry, mechanical telemetry, distance considerations, limitations, telemetry through power line carrier.

UNIT II

WIRELESS TELEMETRY

Functional block, frequency consideration, IRIG standard, line and channel coding, modulation codes, intersymbol interference, frequency division multiplexing-frequency modulation- FM and PM circuits, time division multiplexing- TDM/PAM-PAM/PM-TDM/PCM-PCM system, transmitter circuits, receiver circuits, PCM reception, interference, noise consideration. Bio telemetry. Study of migration of birds using telemetry. Case study.

UNIT III

SATELLITE TELEMETRY

Principle of satellite telemetry, block diagram, selection of frequency, telemetry tracking and command system, noise consideration, ship to shore telemetry using satellite, analog and digital transmission. Example of satellite telemetry system.

UNIT IV

OPTICAL TELEMETRY

Principle of optical telemetry, block diagram, advantages, optical fiber cable, types of fiber cables, light transmission, sources and detector, transmission and receiving circuits, coherent optical fiber communication, power and link budget, losses, Case study.

UNIT V

TELECONTROL

Principle of Telecontrol, block diagram, design aspects, telecontrol instruments, analog and digital techniques in telecontrol, telecontrol using information theory. Remote adjustments, guidance and regulation. Example of Telecontrol system.

Text Books:

1. Telemetry principles by D. Patranabis, TMH.
2. Telecontrol Methods and Applications of telemetry and Remote control by G.Swoboda, Reinhold Publishing Corporation, London, 1991.

Reference Books:

1. Handbook of Telemetry and Remote control by L.Gruenberg, McGraw Hill, New York, 1987.
2. Telemetry Engineering by R.E.Young, Little Books Ltd, London, 1988.
3. *Data Communication and Teleprocessing System by T. Housley, PH Intl, Englewood Cliffs, New Jersey, 1987.*

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B. Tech IV-II Sem. (EIE)

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15A10708 PLC LABORATORY

Course Objective:

- *Students can understand the importance of computerization of process industries*

Course Outcome

- *Students can capable to use computers and PLC's in process systems*

1. Programming a PLC to demonstrate control of a device using one push button, Generating square wave etc.
2. Programming a PLC to demonstrate an operation of Batch process.
3. Configuring and Implementation of programmable PID controllers.
4. Control of a process using dead beat algorithm using simulation.
5. Control of a process using Dahlings algorithm using simulation.
6. PC based control of flow process.
7. PC based control of level process.
8. PC based control of pressure process.
9. PC based control of Thermal process.
10. Online Identification of process parameters from experimental data by least square estimate method.

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15A10709 MICROPROCESSORS AND EMBEDDED SYSTEMS LABORATORY

Course Objective:

To provide practical knowledge of Microcontrollers and concept Embedded Systems

Course Outcome:

Student shall be able to design and implement any Electronic Circuit with Micro Controller

1. Embedded systems lab Experiments using 8051
2. To develop program for basic mathematical operations.
3. To develop a program for block operations
4. To develop a program to generate square wave over port pins.
5. To develop a program to read keyboard and code
6. To develop a program to drive stepper motor
7. To develop a program for temperature indicator using ADC

Experiments using PIC Microcontroller

1) Asynchronous serial communication
2) Pulse Width Modulation (PWM) using CCP module
3) DC motor control

Microprocessors & Embedded Systems Lab Experiments

Phase1:

Normal programming

Phase 2:

Interfacing

Phase 1:

1. Design an assembly language program to perform the different arithmetic operations on the operands
2. Design a program for conversion of binded data to un-binded data.
3. Write a program which accepts input from key board and perform the factorial of the given input using interrupts.
4. Design a program which defines locality of the operands.
5. Write a program to reverse a given string.
6. Write a program to search a character in the given string.

Phase 2:

1) Write an ALP to generate Sinusoidal Wave Using 8255
2) Interface 8251 (USART) with 8086.

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15A10801 DIGITAL IMAGE PROCESSING
(MOOCS-II)

Course Outcomes:

- Able to apply the Image processing concept for various fields of engineering and real life toprocess as per needs &specifications.
- Get the skills to heuristically develop new techniques to process images of any context.
- Can experiment, analyze & interpret imagedata /processing data.

UNIT–I

Introduction to Digital Image processing – Example fields of its usage- Image sensing andAcquisition – image Modeling - Sampling, Quantization and Digital Image representation – Basicrelationships between pixels, - Mathematical tools/ operations applied on images - imaging geometry.

UNIT–II

2D Orthogonal and Unitary Transforms and their properties - Fast Algorithms - Discrete FourierTransform - Discrete Cosine Transforms- Walsh- Hadamard Transforms- Hoteling Transforms ,Comparison of properties of the above.

UNIT–III

Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement infrequency Domain, Image smoothing, Image sharpening, Colour image Enhancement

UNIT–IV

Degradation model, Algebraic approach to restoration – Inverse filtering – Least Mean Square filters,Constrained Least square restoration. Blind DeconvolutionImage segmentation: Edge detection -,Edgelinking, Threshold based segmentation methods – Regionbased Approaches - Template matching –use of motion in segmentation

UNIT–V

Redundancies in Images - Compression models, Information theoretic perspective- Fundamentalcoding theorem. Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Transformcoding, Image Formats and compression standards.

Text Books:

1. R.C .Gonzalez & R.E. Woods, "Digital Image Processing", Addison Wesley/Pearson education,3rd Edition, 2010.
2. A .K. Jain, "Fundamentals of Digital Image processing", PHI.

References:

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, "Digital Image processing usingMATLAB", Tata McGraw Hill, 2010.
2. S jayaraman, S Esakkirajan, T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wilely, 3rd Edition, 2004.

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15A10802 MEMS AND ITS APPLICATIONS
(MOOCS-II)

Course Objectives:

- To study about fabrication processes involved in different types of sensors.
- To Study about characteristics of different MEMS materials.
- To get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Course Outcomes:

After completion of this course the students will be able to

- Understand different steps involved in fabrication processes of different types of sensors.
- Understand characteristics of different MEMS materials.
- Get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Unit-I:

MEMS Fabrication processes & Sensors*:*

Introduction, MEMS Overview, Micro-fabrication of MEMS: Surface Micromachining, Bulk Micromachining, LIGA, micromachining of polymeric MEMS devices, Three-dimensional micro-fabrications. Electromechanical transducers: Piezoelectric transducers, Electro-strictive transducers, Magneto-strictive transducers, Electrostatic actuators, Electromagnetic transducers, Electro-dynamic transducers, Electro-thermal actuators, comparison of electro-thermal actuation process, Micro-sensing for MEMS: Piezo-resistive sensing, Capacitive sensing, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave sensors.

Unit-II:

MEMS Materials and Fabrication techniques: Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS, Bulk micromachining for silicon based MEMS, Silicon surface micromachining, Micro-stereo-lithography for polymer MEMS.

Unit-III:

MEMS Switches and Micro relays: Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, bistable micro relays and micro-actuators, dynamics of switch operation, MEMS switch design considerations, modeling and evaluation.

Unit- IV:

MEMS Inductors and Capacitors: MEMS Micro-machined passive elements: pros and cons, MEMS Inductors: self and mutual inductance, micro-machined inductors, reduction of stray capacitance, improvement of quality factor, folded inductors, modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

Unit-V:

MEMS packaging & MEMS RF Applications: MEMS packaging: Role of MEMS packaging, Types of MEMS packaging, flip-chip and multichip Unit packaging, RF MEMS packaging issues. MEMS RF applications: Micro-machined transmission line and components, micro-machined RF Filters, Micro-machined Phase shifters, and Micro-machined antenna, Gyros and Bio-MEMS.

References:

1. Gabriel M. Rebeiz, “RF MEMS: Theory, Design, and Technology,” John Wiley & Sons, 2003.
2. Vijay K. Varadan, K. J. Vinoy and K. A. Jose, “RF MEMS & Their Applications,” John Wiley & Sons, 2003.
3. Tai-Ran Hsu, “MEMS and Microsystems: Design and Manufacture,” McGraw-Hill.

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15A10803 MECHATRONICS FOR INSTRUMENTATION (MOOCS-III)

COURSE OBJECTIVE:

- *To understand the interdisciplinary applications of Electronics, Electrical, Mec hanical and ComputerSystems for the Control of Mechanical and Electronic S ystems.*

UNIT I

MECHATRONICS, SENSORS AND TRANSDUCERS

Introduction to Mechatronics Systems Measurement Systems Control Systems Microp rocessor based Controllers. Sensors and Transducers PerformanceTerminology Se nsors for Displacement, Position and Proximity; Velocity, Motion,Force, Fluid Press ure, Liquid Flow, Liquid Level,Temperature,Light Sensors – Selection of Sensors

UNIT II

ACTUATION SYSTEMS

Pneumatic and Hydraulic Systems Directional Control Valves Rotary Actuators. M echanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings.Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – Constructionand working principle of DC and AC Motors,speed control of AC and D C drives, Stepper Motors-switching circuitries for stepper motor – AC & DCServo motors

UNIT III

SYSTEM MODELS AND CONTROLLERS

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational Trans national Systems,Electromechanical Systems Hydraulic Mechanical Systems. Continuo us and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PIDControllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – MicroProcessors Control.

UNIT IV

PROGRAMMING LOGIC CONTROLLERS

Programmable Logic Controllers– Basic Structure – Input / Output Processing – Programming –

Mnemonics Timers, Internal relays and counters Shift Registers Master and Jump Controls – DataHandling – Analogs Input / Output – Selection of a PLC.

UNIT V

DESIGN OF MECHATRONICS SYSTEM

Stages in designing Mechatronics Systems Traditional and Mechatronic Design Possibl e Design Solutions. Case studies of Mechatronics systems Pick and place Robot Autonomous mobile robot-Wireless suriviellance balloon- Engine Management system- Automatic car park barrier.

TEXT BOOKS:

1. Bolton,W, "Mechatronics" , Pearson education, second edition, fifth India n Reprint, 2003
2. Smaili.A and Mrad.F , "Mechatronics integrated technologies for i ntelligent machines", Oxforduniversity press, 2008

REFERENCES:

1. Rajput. R.K, A textbook of mechatronics, S. Chand & Co, 2007
2. Michael B. Histand and David G. Alciatore, " Introduction to Mechatroni cs and Measurement Systems", McGraw-Hill International Editions, 2000.
3. Bradley D. A., Dawson D., Buru N.C. and. Loader A.J, "Mechatronics", Chapm an and
4. Hall, 1993.
5. Dan Necsulesu, "Mechatronics", Pearson Education Asia, 2002 (Indian Reprint).
6. Lawrence J. Kamm, "Understanding Electro – Mechanical Engineering", An
7. Introduction to Mechatronics, Prentice – Hall of India Pvt., Ltd., 2000.
8. Nitaigour Premchand Mahadik, "Mechatronics", Tata McGraw-Hill publishing
9. Company Ltd, 2003

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15A10804 JAVA PROGRAMMING
(MOOCS-III)

Course Objective:

- *Study the syntax, semantics and features of Java Programming Language*
- *Learn the method of creating Multi-threaded programs and handle exceptions*
- *Learn Java features to create GUI applications & perform event handling*

Course Outcome:

- *Ability to solve problems using object oriented approach and implement them using Java*
- *Ability to write Efficient programs with multitasking ability and handle exceptions*
- *Create user friendly interface*

UNIT I

Introduction to Java: The key attributes of object oriented programming, Simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

UNIT II

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.
Packages – Defining, Finding, Member Access, Importing.

UNIT III

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, Subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.
I/O: Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading and writing binary data, Random-access files, File I/O using character streams, Wrappers.

UNIT IV

Multithreading: Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, Resuming and Stopping threads. **Applets**: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

Networking: Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

UNIT V

Swings: The origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, jtextfield, jlabel and image icon, The swing buttons, Trees, An overview of jmenubar, jmenu and jmenuitem, Creating a main menu, Add mnemonics and accelerators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien,
2. Special Indian Edition, McGrawHill, 2013.
3. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
3. "Core Java", Nageswar Rao, Wiley Publishers.
4. "Thinking in Java", Bruce Eckel, Pearson Education.
5. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
6. "Head First Java", Kathy Sierra, Bert Bates, O"Reilly
7. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
8. "Java in Nutshell", David Flanagan, O"Reilly
9. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press.