WITH EFFECT FROM THE ACADEMIC YEAR 2005-2006

SCHEME OF INSTRUCTION & EXAMINATION
B.E IV YEAR (REGULAR)

(INSTRUMENTATION ENGINEERING)

SEMESTER - I

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions Periods per Week L/T	D/P	Scheme of Examination Dura-tion in Hrs	Maximum Marks Univ. Exam	Sessi-onals
		THEORY					
1.	EE 404	Microprocessors & Microcontrollers	**4**	**-**	**3**	**75**	**25**
2.	EE 407	Process Control	**4**	**-**	**3**	**75**	**25**
3.	EE 408	Opto-Electronics Instrumentation	**4**	**-**	**3**	**75**	**25**
4.	CE 405	Environmental Studies*	**4**	**-**	**3**	**75**	**25**
5.	EE/EC/ CS/ME	**ELECTIVE – I**	**4**	**-**	**3**	**75**	**25**
		PRACTICALS					
1.	EE 431	DSP Lab	**-**	**3**	**3**	**50**	**25**
2.	EE 432	Microprocessor Lab	**-**	**3**	**3**	**50**	**25**
3.	EE 433	Project Seminar	**-**	**3**	**-**	**-**	**25**
		TOTAL	**20**	**9**	**-**	**475**	**220**

* Pass Compulsory (40% for pass). Marks not to be considered for award of Division

Elective –I

EE 403 Electric Drives & Static Control
EE 409 Analytical Instrumentation
EE 410 Aircraft Instrumentation
EE 405 VLSI Design & Technology
CS 467 Embedded Systems
ME 411 Entrepreneurship

EE 404

MICROPROCESSORS AND MICROCONTROLLORS

Instruction Periods per week	4
Duration of University Examination Hours	3
University Examination Marks	75
Sessional marks	25

UNIT I

The 80386 and 80486 Microprocessors: Introduction to the 80386 Microprocessors, Special 80386 registers, Memory management, protected mode and Virtual mode and 80386 mode, Memory paging mechanism, Introduction to 80486 Microprocessor.

UNIT II

Introduction to Pentium Microprocessors: Special Pentium registers, Pentium memory management, Pentium pro features, Features of Pentium I, Pentium II & Pentium III Microprocessors.

UNIT III

Comparison of Microprocessors and Micro-controllers, Brief survey of 4-bit and 16-bit Micro-controllers (Only INTEL and MOTOROLA), The MCS-48 and MCS-51 series of Micro-controllers, The 8051 architecture

UNIT IV

Programming the 8051, Data transfer instructions, Address modes, Arithmetic and logical operations, Jump and call instructions, Programming tools and techniques.

UNIT V

Applications, Key boards, Display, Pulse measurements, AID and D/A conversions of multiple interrupts, 8051 serial data communications using the A51 Assembler and Simulator

Suggested Reading:

1. Barry B.Brey, The INTEL Microprocessors 808618088, 80186/80188, 80286, 80386, 80486,
Pentium and Pentium Proprocessors, Architecture, Programming and Interfacing, Fourth Edition,
PHI
2. Kenneth.Ayala, The 8051 Micro-controller Achitecture, Programming and Applications, Penrarn
International Publication (India) Pvt. Ltd., 2nd Edition
3. M.Rafiq-uz-zaman, 'Microprocessors- Theory and Applications: Intel and Motorola', Prentice hall
of India, 2001
4. Douglas Hall, 'Microprocessors and Interfacing', Tata McGraw Hill, 2004.

EE 407

PROCESS CONTROL

Instruction per week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 marks

UNIT I

Process characteristics: Process variables, Process degrees of freedom, Characteristics of physical systems, Elements of process dynamics, Liquid processes, Gas processes, Flow processes, Thermal processes, Dead time, Thermal element lag, Pressure element lag.

UNIT II

Controller characteristics: Automatic controller, Proportional control, Integral control, Proportional integral control, Proportional derivative control, PID control action, Two position control, Single speed floating control, Electronic controllers, Two position floating controllers.

UNIT III

Closed loop Automatic control: Effect of closing loop, Proportional control, Integral control, PI control, Derivative control, Static error offset, Velocity error, Ziegler Nichols methods, Two- position control, Single speed floating control.

UNIT IV

Control Valves: Actuators: Electro-mechanical, Hydraulic, Pneumatic. Valve accessories: Pneumatic valve positioner, Valve limit switches, Solenoid valves, Valves: Selection, Performance, sizing and characteristics.

UNIT V

Discrete state Process Control: Introduction, Relay controllers and Ladder diagrams, Elements, Examples. Programmable Logic Controllers (PLCs): Introduction, PLC design, PLC operation, Programming, PLC software functions with examples.

Suggested Reading.

1. Eckman D. P, Automatic Process Control, Wiley Eastern, 1975.
2. Majumdar S.R, Pneumatic System, Tata McGraw, 1995.
3. Curtis D.Johnson, Process Control & Instrumentation Technology, 7th Edition, Pearson Education, 2002
4. Bela G.Liptak, Instrument Engineer's Handbook -Process Control, 3rd Edition, Gulf publications

EE 408

OPTO-ELECTRONIC INSTRUMENTATION

Instruction per week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 marks

UNIT I

Interferometers: Basics of Interference, Young's Double Slit Experiment. Phase difference and path difference, Analytical treatment of interference, Theory of interference, Michelson's Interferometer and its applications, Fabry-Perot Interferometer and Interferometric filters.

UNIT II

Laser fundamentals: Stimulated absorption and emission, Einstein's equations, Classification of LASERS, Solid, liquid, Gas and Semiconductor lasers and their respective energy level diagrams, LED and their characteristics

UNIT III

Optical Fiber Fundamentals: Introduction to optical Fibers, Fundamentals of transmission theory, Fiber fabrication and fiber drawing, Fiber splicing, connectors and jointing techniques, Electro-optic, Mechano-optic and Mechano-optic modulation.

UNIT IV

Fiber-Optic Instrumentation: Classification and principle of fiber optic sensors, Measurement of current, Voltage, Pressure, Temperature, Displacement, Acceleration and Fluid level.

UNIT V

Laser Instrumentation: Laser principle and measurement techniques, Study of atmospheric effects and pollutants, Industrial applications of Lasers, Lasers in Bio-Medical application.

Suggested Reading:

1. Subramanyam & Brijlal, A Text Book of Optics, S.Chand & Company
2. J.Wilson & J.F.B.Hawkes, Opto-Electronics -An Introduction PHI 3rd Edition, New Delhi, 1998.
3. Sukhbir Kumar Sarkar, Optical Fibers and Fiber Optic Communication Systems, 2nd Edition,
S.Chand & Company, 1997
4. John E.Harry, Industrial Lasers and Their Applications McGraw Hill 1974.

CE 405

ENVIRONMENTAL STUDIES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Unit – I

Environmental Studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources; use and over utilization of surfaced and ground water floods, drought, conflicts over water, dams-benefits and problems. Effects of modern agriculture, fertilizer pesticide problems, water logging salinity.

Energy resources; growing energy needs, renewable and non-renewable energy sources, Land Resources; land as a resource, land degradation, soil erosion and desertification.

Unit – II

Ecosystems: Concept of an ecosystem, structure and function of eco system, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem(ponds, streams, lakes rivers, oceans, estuaries).

Unit – III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity

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Unit – IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste management. Environment protection act: Air, water, forest & wild life acts, issues involved in enforcement of environmental legislation.

Unit – V

Social Issues and the Environment: Water conservation, watershed management and environmental ethics. Climate change, global warming, acid, rain, ozone layer depletion. Environmental protection act, population explosion

Suggested Readings:

1. De. A. K. Environmental Chemistry, Wile Eastern Ltd.
2. Odum E.P Fundamentals of Ecology, W.B Sunders Co., USA
3. Rao. M.N and Datta A.K., Waste Water Treatment, Oxford and IBH Pub
4. Miller T.G. Jr., Environment Science, Wadsworth Publishing Co.,

EE 403

ELECTRIC DRIVES AND STATIC CONTROL

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT I

Electric Drives: Concept and Classification, Dynamics of Electric Drives, Types of Loads, Torque Characteristics of Load, Characteristics of Motor-Load Combination, Dynamics of Motor-Load Combination, Steady-state and Transient stability of Electric Drive. Characteristics of Electric Drives: Modified Speed-Torque Characteristics of D.C Shunt motors, D.C Series motor and Induction motors

UNIT II

Starting of Electric Motors: Methods of Starting Electric Motors, Acceleration time, Energy relation during starting, D.C Shunt & Series motors and Induction motors, Methods to reduce the energy loss during starting.
Electric Braking: Types of Braking, Braking of D.C and A.C motors, Energy relation and Dynamics of Braking.

Rating of Motors: Heating effects, Load conditions and Classes of duty, Determination of power rating. Effect of load inertia and load equalization

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UNIT III

D.C motor control: Single-phase controlled rectifier and Chopper circuit arrangement for continuous armature current operation. J al converter control, Circulating current and non-circulating current modes of operation, Principles of closed loop control for D.C drives.

UNIT IV

Induction motor control: Speed control of 3-phase Induction motor with A.C voltage regulators, Voltage source inverters and Cyclo-converters, Static rotor resistance control, Slip power recovery schemes: Static Krammer drive and Scherbius drive.

UNIT V

Synchronous motor control: Self controlled and Separately controlled , synchronous motors, Brushless D.C motors, Switched reluctance motors.

Suggested Reading:

1. S.K.Pillai, A First Course in Electrical Drives, New Age International, 2000
2. G.K.Dubey, Fundamentals of Electric Drives, Narosa Public House, Delhi, 2001
3. M.D.Singh and K.B.Khanchandani, Power Electronics, Tata McGraw Hill Publishing Company
Ltd., 2000
4. Bimal.K.Bose, Modern Power Electronics and AC Drives, Pearson Education Asia, 2002

EE 409

ANALYTICAL INSTRUMENTATION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT I

Review of basic components of analytical instrumentation, Calorimeter and Spectrophotometers, Electromagnetic radiation, Beer-Lamberts Law, Absorption instruments, Calorimeters, Spectrophotometers sources of error and calibration.

UNIT II

Infra-red Spectrophotometers, Infra-red Spectroscopy, Basic components, Types of IR Spectrometry, Sample handling techniques, FT -IR Spectroscopy, Calibration, Mass Spectrometers, Basic mass Spectrometer, Types, Components, Resolution and application of Mass Spectroscopy.

UNIT III

NMR, Principle of NMR Spectroscopy, Different types of NMR Spectrometers, Chromatography, Basics of Gas Chromatography, Methods of measurement of peak areas, Liquid Chromatography, Types of amino acid analyzers.

UNIT IV

Electro-mechanical instruments, Electro-chemical cell, Types of electrodes, Potentiometers, Conductivity meters, Polar-graphs, pH meters, Principle of measurement, Electrodes, Selective, Ion electrode, chemically sensitive semi-conductor devices, Bio-sensors.

UNIT V

Industrial gas analyzers, Types, Para-magnetic oxygen analyzer, Magnetic wind instrument, Infra-red gas analyzer, Thermal conductivity analyzer, Analyzer based on gas density, Methods based on ionization.
Environmental pollution monitoring instruments: Air Pollution monitoring instruments, Co-So_2-No Wet Chemical air analysis, Water pollution monitoring instruments.

Suggested Reading:

1. H.M.Willard, L.L.Meritt, J.A.Dean, Instrumental Methods of Analysis, CBS Publishers, Delhi

2. R.S.Khandpur, Analytical Instruments, Tata McGraw Hill, 1989

EE 410

AIRCRAFT INSTRUMENTATION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT I

Introduction: Aircraft types, Components of the Airplane, Introduction to Aircraft Instruments, Classification of Aircraft Instruments, Instrument displays, Cockpit layout.

UNIT II

Flight Instruments: Static and Pilot pressure source, Standard atmosphere, Measurement systems for Attitude, Aircraft speed, Mach no., Rate of climb and Acceleration

UNIT III

Aircraft Attitude and Directional Systems: Gyroscope theory, Turn and Slip indication, Directional Gyroscope, Artificial Horizon, Terrestrial magnetism, direct reading compass, Gyro-stabilized directional systems.

UNIT IV

Engine Instruments: Aircraft Engine fuel flows and fuel quantity measurements, Engine temperature measurements.

UNIT V

Integrated Display Systems: Head-up displays, Flight director systems, integrated attitude heading reference system.

Suggested Reading:

1. Ehj Pallet, Aircraft Instruments and Integrated Systems, Pitman & Sons, 1991 (Indian Agent:
English Book Store, Connaught Circus, New Delhi)
2. Wh.Coulthard, Aircraft Instrument Design, Pitman & Sons
3. C.A. Williams, Aircraft Instruments, Galgotia Publications, New Delhi

EC 405

VLSI DESIGN

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT -I

Review of semiconductor devices, Passive components for ICs, Device Structures, BJTS, JFETS,
MOSFETS -depletion types and enhancement type. Basic logic (Gates) circuits with BJTS,
MOSFETS (N-MOS, P-MOS, BiCMOS. Sequential Circuits -Flip Flops & Latches.

Concept of Sheet resistance -Resister design, capacitor design - Considerations for the Design of BJT, MOSFET.

UNIT-II

Circuit or Cell Design, Importance of aspect ratio in FETS, emitter area in BJTS. Design of Inverters
with different loads, design of AND, OR, NAND, NOR Gates, Influence of FAN -IN and FAN OUT
on Gate design, Design of latches and Flip Flops.

UNIT -III

System level design considerations, Counters shift registers, Arithmetic logic Unit, Multiplexer,
memories -ROM, Static RAM, Dynamic RAM. CAD tools -Simulation and Synthesis.

UNIT-IV

Different layers of ICs, (Unit Processes) wafer preparation -Epitaxy, Diffusion, Ion implantation,
oxidation, Chemical vapor deposition, Optical lithography, Etching, Metalization, Bonding,
Packaging and testing. Process flow for N- MOS, CMOS, BiCMOS.

UNIT-V

Basic current mirrors and single stage amplifiers, simple CMOS current mirror, Common source, Common drain and common gate amplifiers, Bipolar current mirrors, Basic operational amplifier.

Suggested Reading:

1. Wayne Wolf, Modem VLSI Design: System-on-Chip Design, Pearson Education, 3rd ed., 2005.
2. Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design, PHI, 2004.
3. John Martin, Analog Integrated Circuits, John Wiley & Sons, 1997.
4. Sung- Mo (Steve) Kang & Yusuf Leblebiei, CMOS Digital Integrated Circuits, 3rd ed., TMH,
2003.

CS 467

EMBEDDED SYSTEMS

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

Introduction to Embedded systems, Processor and memory organization, devices and buses for device networks

Unit – II

Device drivers and interrupts servicing mechanism, Programming concepts and embedded programming in C & C++

Unit – III

Program modeling concepts in single and multiprocessor systems software development process, software engineering practices in the embedded software development process.

Unit – IV

Interprocess communication and synchronization of processes, task and threads. Real time operating systems, Real time operating systems, Real time operating system programming tools: Micro C/OS-II and VxWorks.

Unit – V

Case studies of Programming with RTOS, Hardware-Software Co-design in an Embedded system.

Suggested Reading:

1. Raj kamal, "Embedded Systems Architecture, Programming & Design", Tata McGraw Hill,
2. 2003.
3. Frank Vahid, Tony Givargis, "Embedded System Design, A Unified hardware/software
    a. Introduction", John Wiley & Sons(ASIA) Pvt Ltd.2002
4. David E Simon, "An Embedded Software Premier", Pearson Education, 1999

ME 411

ENTREPRENEURSHIP

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit –I

Indian Industrial Environment – Competence, Opportunities and challenges, Entrepreneurship and economic growth. Small Scale Industry in India Objectives, Linkage among small medium and heavy industries. Types and forms of enterprises.

Unit –II

Identification and characteristics of entrepreneurs. Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas and their sources. Choice of Technology – Collaborative interaction for Technology development.

Unit –III

Project formulation. Analysis of market demand. Financial and profitability analysis and technical analysis. Project financing in India.

Unit –IV

Project Management during construction phase, project organization, project planning and control using CPM, PERT Techniques. Human aspects of project management. Assessment of tax burden.

Unit – V

Behavioral aspects of entrepreneurs: Personality – determinants , attributes and models. Leadership concepts and models. Values and attitudes. Motivation aspects. Change behavior.

Time Management: Various approaches of time management, their strengths and weaknesses. The urgency addiction and time management matrix.

Suggested Reading:

1. Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himalya Publishing
    a. House, 1997.
2. Prasanna Chandra, Project – Planning. Analysis, Selection, Implementation and Review, Tata
3. McGraw Hill publishing Company Ltd. 1995.
4. Stephen R. Covey and Roger Merrill A., First Things First, Simon and Schuster publication,
5. 1994.
6. Sudha G.S., Organizational Behaviour, National Publishing house, 1996

EE 431

DSP LAB

Instruction per Week	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

List of Experiments:

1. Verification of Convolution theorem

2. Waveform Generation -Square, Triangular, Ramp and Trapezoidal

3. DFT Computation -FFT Algorithms

4. Design, Implementation and Verification of Low-pass and High-pass Filters.

5. Capture and Display of real-time signals.

6. Controlling the Stepper motor using Digital Signal Processor

7. Key-pad interfacing with Digital Signal Processor

8. D.C Motor speed control using Digital Signal Processor

9. LED interfacing with Digital Signal Processor

10. Single-phase motor speed control using Digital Signal Processor

11. Estimating the frequency content of a given signal

12. Speed control of Brushless D.C motor using Digital Signal Processor

Atleast ten experiments should be completed in the semester.

EE 432

MICPROCESSOR LAB

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

List of Experiments:

Exercises on 8085:

1. Programmes on Data transfer instructions

2. Programmes on Arithmetic and Logic Instructions

1. Programmes on Branch instructions, Loop and Delays subroutines

2. Programmes on using Lookup tables

3. Programmes on Interrupts.

6. Interfacing with A/D Converter module

7. Generation of Sine and Triangular waves using DAC

8. Interfacing LEDs

9. Study of Timer 8253

10. Interfacing of Seven-segment display

Exercises on 8086:

11. Programmes for signed multiplication and division

12. Programmes for unsigned multiplication and division

13. Programmes for finding the largest number in an array

14. Programmes for sum of series of numbers

15. Multi-byte addition

Atleast ten experiments should be completed in the semester out of which at least two
experiments should be from Exercises on 8086.

EE433

PROJECT SEMINAR

Instruction	3 Periods per week
Sessional	25 Marks

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of his/her specialization.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects of a seminar presentation.

- Literature Survey
- Organization of the material
- Presentation of OHP slides/PC presentation
- Technical writing

Each student is required to:

1. Submit a one page synopsis before the seminar talk for display on the notice board
2. Give a 20 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute discussion.
3. Submit a report on the seminar topic with a list of reference and slides used.

Seminars are to be scheduled from the 3rd week to the last week of semester and any change in schedule should be discouraged.

For award of Sessional marks students are to be judged by at least two faculty members on the basis of an oral and written presentation as well as their involvement in the discussions.