DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

Scheme of Instruction
and
Syllabi of

# B.E. (ECE)

## III/IV - I Semester

(With effect from 2017-2018)

VASAVI COLLEGE OF ENGINEERING
(Autonomous Institution Under UGC)
Ibrahimbagh, Hyderabad - 500 031.
Telangana.

# VASAVI COLLEGE OF ENGINEERING
## SCHEME OF INSTRUCTION AND EXAMINATION

## B.E. III/IV – I SEMESTER

| S.NO. | Code | Subject | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods / week | | | | Duration in Hrs | Maximum Marks | | |
| | | | L | T | D | P | | Sem. Exam | Sessionals | |
| THEORY | | | | | | | | | | |
| 1 | EC 3010 | Linear ICs & Applications | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 2 | EC 3020 | Digital ICs & Applications | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 3 | EC 3030 | Analog Communication | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 4 | EC 3040 | Microprocessors & Microcontrollers | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 5 | EC 3050 | Automatic Control Systems | 3 | - | - | - | 3 | 70 | 30 | 3 |
| 6 | EC 3060 | Electronic Instrumentation | 3 | - | - | - | 3 | 70 | 30 | 3 |
| 7 | EC 3070 | FS - III: Technical Skills | 1 | 1 | - | - | 1.5 | 35 | 15 | 1 |
| 8 | HS 3110 | FS - III: Soft skills | 1 | 1 | - | - | 1.5 | 35 | 15 | 1 |
| PRACTICALS | | | | | | | | | | |
| 9 | EC 3311 | IC Lab | - | - | - | 2 | 3 | 50 | 25 | 1 |
| 10 | EC 3321 | Microprocessor & Microcontroller Lab | - | - | - | 2 | 3 | 50 | 25 | 1 |
| 11 | EC 3331 | Networking Lab | - | - | - | 2 | 3 | 50 | 25 | 1 |
| | | Total | 20 | 6 | - | 6 | | 640 | 285 | 23 |
| | | Grand Total | 32 | | | | | 925 | | |

# LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

| | | |
|---|---|---|
| Subject Code : EC 3010 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • Students will acquire the knowledge of linear IC applications and design various circuits using IC's for any given specifications. | **At the end of the course students will be able to:**<br>• Describe the internal circuits, parameters and features of op-amp.<br>• Use Op-amp as a control element in the design of linear and non-linear circuits.<br>• Compare the p<br>• Design and analyze various applications using ICs.<br>• Illustrate the function of ICs such as PLL and 555 IC and study of their applications.<br>• Design an IC power supply using 78XX, 723 ICs. |

**UNIT – I**

Review of differential amplifiers & level shifter.

Operational Amplifier: Op-amp Block Diagram, ideal Op-amp Characteristics, op-amp and its features, Op-Amp parameters & Measurements, Input and Output Offset voltages and currents, Slew Rate, CMRR, PSRR. Frequency Response and Compensation techniques: Dominant pole compensation, pole zero compensation, internal compensation.

**UNIT – II**

Op-amp Applications I: Inverting and Non-inverting Amplifiers with ideal and non-ideal

Op-amps, Voltage Follower, Difference Amplifier, Summing Amplifier, Ideal and Practical Integrator, Differentiator, V to I and I to V converters, Instrumentation Amplifier, Sample and Hold Circuit, Log and Antilog amplifiers, Precision Rectifiers.

**UNIT – III**

Op-amp Applications II: Schmitt Trigger with and without reference voltage, Astable Multivibrator, Monostable multivibrator, Triangular waveform generator.

Active Filters: Introduction, Butterworth $1^{st}$ order, $2^{nd}$ order low pass and high pass filters. Wide and Narrow Band-pass, Band-reject and All-pass filters.

**UNIT – IV**

Timer: Introduction to 555 timer and its functional diagram, Monostable, Astable and Schmitt Trigger applications.

IC Function Generator: Analysis and Design of Function Generators using IC 8038 Voltage Controlled Oscillator: Operation and Applications using IC 566.

Phase Locked Loops: Introduction, Principles, Block Schematic and Description of IC 565, Applications of PLL: Frequency multiplication and frequency synthesis.

**UNIT – V**

IC Regulators: Introduction, Analysis and design of regulators using 78XX and 723 monolithic ICs, Current limiting and Current foldback techniques using IC 723.

Data Converters: Introduction, basic Digital to Analog Converter techniques, Weighted Resistor DAC, Inverted R-2R Ladder DAC. Analog to Digital Converter: Types; Parallel Comparator ADC, Successive Approximation ADC and Dual Slope ADC. DAC and ADC specifications.

**Suggested Reading:**

1. David A. Bell, "*Operational Amplifiers and Linear ICs*," 3/e, Oxford Publications, 2011.
2. Roy, Chowdhury D., & Jain, Shail B., "*Linear Integrated Circuits*," 4/e, New Age International Publishers, 2010.
3. Sergio Franco, "*Design with Operational Amplifiers and Analog Integrated Circuits*," 3/e, TMH, 2008.
4. Ramakant A. Gayakwad, "*Op-Amps and Linear Integrated Circuits,*" 4/e, PHI, 2010.
5. K.R.Botkar, "*Integrated Circuits*," 10/e, Khanna Publishers, 2010.

# DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

| | | |
|---|---|---|
| Subject Code : EC 3020 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • Student shall describe specifications of a digital IC for various logic families and design combinational and sequential circuits with digital ICs. | **At the end of the course students will be able to:**<br>• Define specifications of digital IC and select appropriate IC based on specifications.<br>• Classify various logic families, summarize their features and select suitable family for a given application.<br>• Design combinational circuits using digital IC's.<br>• Design a Sequentail circuit and memories using various digital IC's. |

**UNIT – I**

Manufacturer's designations for integrated circuits, Development of integrated circuits, Integrated circuit package types, Pin identifications and temperate ranges, IC characteristics, Introduction to diode and transistor logic families. TTL logic family, TTL series, Output configurations, Open Collector, Totem pole, Tri State logic.

**UNIT – II**

Concept of negative logic, ECL logic family, MOS logic family (pMOS and nMOS) CMOS logic family and its characteristics, CMOS transmission gate ( bilateral switch), and its applications, CMOS open drain and high impedance outputs. Dynamic MOS logic family, dynamic MOS inverter, dynamic NAND and NOR gates, Comparison of various logic families. Interfacing of CMOS and TTL driving CMOS ECL driving TTL and TTL driving ECL.

**UNIT – III**

Design using TTL-74XX and CMOS 40XX series: Demultiplexers, drivers for LED and LCD displays, Multiplexers and their applications, Parity generators and Checker circuits, Digital Comparator and Digital. Parallel and serial binary adder/subtractor circuits using 2's compliment, Multiplier, Decimal adder, look- ahead adder.

**UNIT – IV**

Flip-flops and their conversions, Design of Synchronous and Asynchronous counters, Decade Counters, Cascading of BCD counters, application of counters, Shift register and applications, Familiarity with 74 XX and CMOS 40XX series of IC Counters. Sequence detector.

**UNIT – V**

ROM, PROM, EPROM, EEPROM, RAM, Types, Architectures, operation and applications, NVRAM, Flash memory, CCD. Expanding word size and capacity. ASICs, Introduction to PLD's, Architectures of PAL, PLA with operation.

**Suggested Reading:**

1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "*Digital Systems: Principles and Applications,*" PHI, 10/e, 2009.
2. Jain R.P., "*Modern Digital Electronics,*" 3/e, TMH, 2003.
3. Sonde, B. S., "*Introduction to system Design using IC's,*" Wiley, 2/e, 1994.
4. Morris R L and Miller J R, "*Designing with TTL Integrated Circuits,*" TMH, 1971.

# ANALOG COMMUNICATION

| | | |
|---|---|---|
| Subject Code : EC 3030 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To understand the basic concepts of Analog continuous and Pulse modulation schemes.<br>• To design and analyse AM and FM transmitters and receivers.<br>• To understand the importance of noise, its effect and also to estimate the figure of merit of various communication systems. | **At the end of the course students will be able to:**<br>• Analyze and apply the knowledge of signals to analog modulation and demodulation schemes.<br>• Formulate different analog modulation schemes in terms of modulation index, bandwidth, transmitted power.<br>• Analyse the performance characteristics of analog communication receiver<br>• Estimate noise figure based on the knowledge of different types of receivers.<br>• Acquire knowledge about pulse modulation schemes. |

**UNIT – I**

Linear Modulation schemes: Need for modulation, double side band suppressed carrier (DSB-SC) modulation, conventional Amplitude Modulation (AM). Hilbert transform, properties of Hilbert transform. Pre-envelop. Complex envelop representation of band pass signals, In-phase and Quadrature component representation of band pass signals. Low pass representation of band pass systems. Single side band (SSB) modulation and Vestigial-side band (VSB) modulation. Modulation and demodulation schemes

**UNIT – II**

Angle modulation schemes: Frequency Modulation (FM) and Phase modulation (PM), Concept of instantaneous phase and frequency. Types of FM modulation: Narrow band FM and wide band FM. FM spectrum in terms of Bessel functions. Direct and indirect (Armstrong's) methods of FM generation. Balanced discriminator, Foster–Seeley discriminator and Ratio detector for FM demodulation. Pre-Emphasis and De-Emphasis. Capture effect.

**UNIT – III**

Transmitters and Receivers: Classification of transmitters. High level and low level AM transmitters. FM transmitters. Principle of operation of Tuned radio frequency (TRF) and super heterodyne receivers. Selection of RF amplifier. Choice of Intermediate frequency. Image frequency and its rejection ratio, Receiver characteristics: Double spotting, Tracking and alignment, Automatic Gain Control.

**UNIT – IV**

Noise Sources and types. Atmospheric noise, Shot noise and thermal noise. Noise temperature. Noise in two-port network: noise figure, equivalent noise temperature and noise bandwidth. Noise figure and equivalent noise temperature of cascade stages. Narrow band noise representation. S/N ratio and Figure of merit calculations in AM, DSB-SC, SSB and FM systems.

**UNIT – V**

Analog pulse modulation schemes: Sampling of continuous time signals. Sampling of low pass and band pass signals. Types of sampling. Pulse Amplitude Modulation (PAM) generation and demodulation. Pulse time modulation schemes: PWM and PPM generation and detection.

**Suggested Reading:**

1. Simon Haykin, "*Communication Systems*," 4/e, Wiley India, 2011.
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "*Principles of Communication Systems*," 3/e, TMH, 2008.
3. P. Ramakrishna Rao, "*Analog Communication*," 1/e, TMH, 2011.
4. A. Bruce Carlson and Paul B. Crilly, "*Communication Systems*," 5/e, 2011.
5. Singh, R.P. and Sapre, S.D., "*Communication Systems*," TMH, 2007.

# MICROPROCESSORS AND MICROCONTROLLERS

| | | |
|---|---|---|
| Subject Code : EC 3040 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To familiarize the students with the concept of 8086μp and 8051μc in the aspects of architectural, programming and interfacing with the real world. | **At the end of the course students will be able to:**<br>• Define microprocessor and Analyze basic features by applying the knowledge of digital engineering fundamentals.<br>• Apply Knowledge to the programming concepts of 8086μp to effectively program in assembly level language.<br>• Specify features of its associated interfacing devices used to formulate and design a complete system.<br>• Differentiate between a microprocessor and microcontroller and choose a particular target for designing an application as per technology update.<br>• Formulate and organize the system resources to design a particular system as a team |

**UNIT – I**

8086/8088 Architecture and Instruction set: Minimum and Maximum mode operations, 8086 control signal interfacing under minimum mode system, control signal interfacing under maximum mode using multiprocessing systems. Addressing modes, Interrupt structure, Instruction formats, Instruction execution timings. Brief overview of x86 series microprocessors.

**UNIT – II**

8086 Assembly Language programming: Assembler directives and operators, programs using data transfer, arithmetic, logical, Branching and ASCII instructions. String processing, Procedures, Macros and stack, Basic programs using DOS functions. Introduction to assemblers and debugging tools.

**UNIT – III**

8086 Interfacing: Memory interfacing using standard RAM, EPROM IC Chips, 8255 PPI, 8253/8254 programmable interval timers, need for DMA and interfacing with DMA controller (8257 IC), Keyboard & display controller (8279) interfacing, programmable communication interface (8251). Serial and parallel data transmission formats, USART interfacing.

**UNIT – IV**

8051 Microcontroller: Classification, Internal architecture of 8051 and its pin configuration, Memory organization and expansion. 8051 instruction set, addressing modes and bit addressable features. Data transfer, arithmetic, logical and branching groups. Interrupt and I/O port structures and their operations. Assembly language Programming with 8051. 8051 timer and counter and its programming.

**UNIT – V**

Interfacing and Applications: 8051 Serial data communication and interrupt programming. 8051 Interfacing with external memory, expansion of I/O ports. A/D converter, D/A converter, Seven- segment display, LCD module, Keyboard and Stepper Motor interfacing with 8051.

**Suggested Reading:**

1. Ray A.K & Bhurchandhi K.M, "*Advanced Microprocessor and Peripherals,*" 2/e, TMH, 2007.
2. Douglas V Hall, "*Microprocessors and Interfacing Programming and Hardware,*" 2/e, THM, 2007.
3. Walter A. Triebal and Avtar Singh, "*The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware and Applications,*" 4/e, Pearson Education, 2007.
4. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "*The 8051 Microcontroller & Embedded Systems using Assembly and C,*" 2/e, Pearson Education, 2007.
5. Ayala K.J, "*The 8051 Micro Controller Architecture, programming and Application,*" Penram International, 2007.

# AUTOMATIC CONTROL SYSTEMS

| | | |
|---|---|---|
| Subject Code : EC 3050 | Instruction : 3 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • Apply principles of control theory to model physical system.<br>• Analyze the performance of a given system in time and frequency domains and choose appropriate compensator if needed. | **At the end of the course students will be able to:**<br>• Derive dynamic equations for electro mechanical systems and obtain transfer function using block diagram reduction technique, Mason's gain formula from given system model.<br>• Analyze the stability of the system in time domain and determine its performance characteristics.<br>• Apply Bode plot, Nyquist criteria techniques to determine the performance of the system in frequency domain.<br>• Determine the transfer function and stability for digital control system.<br>• Analyze the system in the presence of initial conditions and apply Kalman's test for controllability and observability. |

**UNIT – I**

Control System fundamentals and Components: Classification of control systems, Open and Closed loop systems, Error sensing devices – potentiometers and syncros. AC and DC servo motors. Mathematical modeling of mechanical systems and their conversion into electrical systems. Block diagram reduction and Signal flow graphs.

**UNIT – II**

Time response: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, error series, Routh - Hurwitz criterion for stability.

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

**UNIT – III**

Frequency response plots: Bode plots, frequency domain specifications. Gain margin and Phase Margin. Principle of argument, Polar plot, Nyquist plot and Nyquist criterion for stability. Compensation: Cascade and feedback compensation using Bode plots. Phase lag, lead, lag-lead compensators. PID controller.

**UNIT – IV**

Discrete Control Analysis: Digital control, advantages and disadvantages, and digital control system architecture. The discrete transfer function. Sampled data system. Transfer function of sample data systems. Stability of Discrete data systems.

**UNIT – V**

State Space Representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix, Solution of state equations. Design of digital control systems using state-space concepts. Controllability and observability.

**Suggested Reading:**

1. Nagrath, I.J., and Gopal, M., "*Control System Engineering*," New Age Publishers, 5/e, 2009.
2. Ogata, K., "*Modern Control Engineering*," 5/e, PHI, 2010.
3. Benjamin C. Kuo, "*Automatic Control Systems*," 7/e, PHI, 2010.
4. Richard C. Dorf & Robart H. Bishop, "*Modern Control Systems*," 11/e, Pearson, 2008.
5. Gopal, Madan, "*Digital Control Engineering*," 1/e, New Age Publishers, 2008.

# ELECTRONIC INSTRUMENTATION

| | | |
|---|---|---|
| Subject Code : EC 3060 | Instruction : 3 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • The students will be able to understand basic measurement concepts, concepts of electronic measurements, importance of signal generators and signal analyzers in measurements, relevance of digital instruments in measurements, the need for data acquisition systems, measurement techniques in biomedical field. | **At the end of the course students will be able to:**<br>• Apply knowledge to reduce errors in measurements and safety measures.<br>• Design a measuring system model.<br>• Communicate on engineering problems related to medical field.<br>• Select and apply appropriate instruments for a specific applications in measurements.<br>• Demonstrate knowledge and understanding about various measuring instruments. |

**UNIT – I**

Accuracy, Precision, Resolution and Sensitivity. Errors and their types. Standards of measurement, classification of standards, IEEE standards, Elements of ISO 9001, Quality management standards.

**UNIT – II**

Transducers: classification, factors for selection of a transducer, transducers for measurement of velocity, acceleration, force, radio activity, Hot wire anemometer. Passive electrical transducers- Strain gauges and strain measurement, LVDT and displacement measurement, capacitive transducer and thickness measurement. Active electrical transducers: Piezo electric, photo conductive, photo voltaic and photo emissive transducers.

**UNIT – III**

Characteristics of sound, pressure, power and loudness measurement. Microphones and their types. Temperature measurement, resistance wire thermometers, semiconductor thermometers and thermocouples. Humidity measurement, resistive capacitive, aluminum oxide and crystal Hygrometer types.

**UNIT – IV**

Block diagram, specification and design considerations of different types of DVMs. Digital LCR meters, Spectrum analyzers. The lEEE488 or GPIB Interface and protocol.

Delayed time base oscilloscope, Digital storage oscilloscope, and mixed signal oscilloscope. Introduction to virtual instrumentation, SCADA. Data acquisition system block diagram

**UNIT-V**

Biomedical Instrumentation: Human physiological systems and related concepts. Bio-potential electrodes Bio-potential recorders - ECG, EEG, EMG, X- ray machines and CT scanners, magnetic resonance and imaging systems, Ultrasonic Imaging systems.

**Suggested Reading:**

1. Albert D. Helfric, and William D. Cooper, "*Modern Electronic Instrumentation and Measurement Techniques"*, PHI, 2010.
2. H S Kalsi, "*Electronic Instrumentation"*, 3/e, TMH, 2011.
3. Robert A Witte, "*Electronic Test Instruments: Analog and Digital Measurements"*, 2/e, 2002.
4. Nakra B.C, and Chaudhry K.K., "*Instrumentation, Measurement and Analysis"*, TMH, 2004
5. Khandpur. R.S.,"*Handbook of Bio-Medical Instrumentation"*, TMH, 2003.

# FINISHING SCHOOL – III : TECHNICAL SKILLS

## BASICS OF JAVA

| | | |
|---|---|---|
| Subject Code : EC 3070 | Instruction : 1+1 Periods per week | Sessionals Marks : 15 |
| SEM Exam Marks : 35 | SEM Exam Duration : 1.5 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • students will be able to develop Java programs that leverage the object-oriented features of the Java language, use data types, arrays and other data collections.<br>• Implement error-handling techniques using exception handling<br>• Develop technical skills necessary for complete understanding of front-end web development. | **At the end of the course students will be able to:**<br>• Analyze the semantics of HTML, Java script.<br>• Interpret the different parts of a web page.<br>• Interpret the Java SDK environment to create, debug and run simple Java programs.<br>• Apply fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.<br>• Demonstrate understanding of applets, events and keywords. |

**UNIT – I**

HTML for Java Programmers: Introduction to Internet. HTML, HTML format, HTML tags, the applet tag, HTML Document Creation. Introduction to scripting languages VBScript and Java Script.

**UNIT – II**

Overview of Java, Features of Java, Java tools, Java applications, The Java language: Java keywords, Primitive types, Literals, Arrays, Operators, and Control Operations: Selection, Iteration, Jumping.

**UNIT – III**

Java Classes class inheritance

Exception handling, working with Threads: Thread basics, Thread classes, Creating Threads, scheduling and Thread Priorities, Daemons, Grouping threads, Thread states, Synchronization, Packages.

**UNIT – IV**

Java Applets, Programming the user interface: Introduction and Basic Concepts, Abstract Window Toolkit (AWT), Drawing, Interactive Interface Elements, Organizing Interface with Layouts, Images, Windows, Frames, Dialog Box, and File Dialog Box

**UNIT – V**

Applet method of interest, Extending the AWT, Extending Components, Event Handling: AWT Event handling, the Event class, java input events:

**Suggested Reading:**

1. Thomas. A. Powell, *HTML- The Complete Reference*, TMH, 2002.
2. Herbert Schildt, *JAVA – The Complete Reference*, TMH, 2014 9th edition.
3. Comer, *Internet Book – everything you need to know about computer networking & How Internet Works*, 4th PHI, 2015.

# FINISHING SCHOOL – III : SOFT SKILLS

| | | |
|---|---|---|
| Subject Code : HS 3110 | Instruction : 1+1 Periods per week | Sessionals Marks : 15 |
| SEM Exam Marks : 35 | SEM Exam Duration : 1.5 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| This is a foundation course and aims at enhancing employability skills in students. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. Students will be trained to work systematically with speed and accuracy while problem solving.<br>The three major areas covered in this course include<br>1. Numerical Ability<br>2. Arithmetic Ability<br>3. General reasoning | **At the end of the course students will be able to:**<br>• Solve questions on the above mentioned areas using short cuts and smart methods<br>• Understand the fundamentals concepts of Aptitude skills<br>• Perform calculations with speed and accuracy |

**UNIT – I : QUANTITATIVE APTITUDE - NUMERICAL ABILITY**

- Numerical Ability
- Introduction to higher order thinking skills
- Speed Maths
- Number systems
- LCM & HCF

**UNIT – II : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION**

- Arithmetic Ability
- Percentage
- Profit loss and discounts
- Ratio proportions Allegations and mixtures
- Averages

**UNIT – III : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED**

- Arithmetic Ability
- Time speed and distance
- Time and work
- Interest calculations

**UNIT – IV : REASONING ABILITY – GENERAL REASONING PART 1**

- General Reasoning
- Coding decoding
- Directions
- Series completions

**UNIT – V : REASONING ABILITY- GENERAL REASONING PART 2**

- General Reasoning
- Analogies
- Classification
- Alphabet test
- Mathematical operations

# INTEGRATED CIRCUITS LAB

| | | |
|---|---|---|
| Subject Code : EC 3311 | Instruction : 2 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : 50 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • Students will design and verify circuits using ICs for the given specifications. | **At the end of the course students will be able to:**<br>• Design and implement the applications of Op-Amps.<br>• Design and verify the characteristics of 555 timer and 723voltage regulator IC's.<br>• Design and verify various combinational circuits such as adders, code-converters etc.<br>• Design and verify various sequential circuits such as adders, code-converters etc. |

## Lab Experiments:

### PART – A

1. Measurement of parameters of Op-Amp. Voltage Follower, Inverting and Non Inverting Amplifiers, Level Translators using Op-Amp.
2. Arithmetic Circuits: Summer, Integrator Differentiator using Op-Amp.
3. Active filters: LP, HP and BP using Op-Amp.
4. Op-Amp Oscillators: RC phase shift oscillator, wein bridge oscillator.
5. Triangle and Square wave Generators. Schmitt Trigger using Op-Amp.
6. Voltage Controlled Oscillator Using LM 566.
7. IC Regulators and current boosting.
8. Applications of 555 Timer.
9. PLL characteristics

### PART – B

1. Measurement of propagation delay, fan-out, Noise margin and transfer Characteristics of TTL and CMOS IC gates and open collector / drain gates.
2. Designing code converters using logic gates and standard code converters. Parity generator and checker circuit.
3. Flip-Flop conversions and latches using gates and ICs.
4. Designing Synchronous, Asynchronous up/down counters
5. Shift registers and ring counters using IC Flip-Flops & Standards IC counters.
6. Full adders, subtractors using logic gates and multiple bits IC Adder/Subtractor and arithmetic Circuits.
7. Mux - Demux applications.
8. Interfacing counters with 7-segment LED/LCD display units.
9. Mealy and Moore type sequence detector

## General Note:

1. At least 5 experiments from each part.
2. A total of not less than 10 experiments must be carried out during the semester.
3. Analysis and design of circuits, wherever possible, should be carried out using SPICE tools.

# MICROPROCESSOR AND MICROCONTROLLER LAB

| | | |
|---|---|---|
| Subject Code : EC 3321 | Instruction : 2 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : 50 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • To familiarize students with the programming aspects of assembly language and C programming with 8086μp and 8051μc in interfacing with real world using X86 kits and perform virtual design simulation on proteus 7.2 for 8051 microcontroller in embedded 'C' with (μ vision-4) IDE. | **At the end of the course students will be able to:**<br>• Apply knowledge in writing the programs using keilμVision4 software for microcontroller and Masm assembler tool for Microprocessor.<br>• Generate a suitable Interface with onchip peripherals of 8051μc.<br>• Interface off chip peripherals by programming the interrupts to meet the design solution<br>• Design and execute a mini project based on given specifications using modern software tools. |

**PART – A**

**[Experiments on assembly language programming for 8086 μP using Assembler]**

1. Execution of basic programs on 8086 microprocessor (8 bit and 16 bit arithmetic operations).
2. Programs using different addressing modes.
3. Single byte, multi byte binary and BCD addition and Subtraction.
4. Code conversions.
5. String Searching and Sorting
6. Generation of waveforms and gating applications using 8253/8254 timers.
7. Generation of waveforms using DAC interface.
8. Monitor utilities of 8086 kit for Keypad/displaying results.

**PART – B**

**[Experiments on Embedded C programming for 8051 μC using Keil IDE]**

1. LED toggle, Switch control logics in polling mode.
2. Timer and counter programming.
3. Square wave generation with variable duty cycle (PWM).
4. Interrupt programming
5. Serial communication using RS 232 UART protocols.
6. Interfacing for A/D applications.
7. Program to control stepper motor and DC motor.
8. LCD display interfacing (4-bit and 8-bit mode).
9. Keypad interfacing.

**General Note:**

1. At least 7 experiments from each part.
2. A total of not less than 14 experiments must be carried out during the semester.
3. Analysis and design of circuits, wherever possible should be carried out using SPICE tools.

**Special Note:**

- Sessional marks are to be awarded as per the following breakup.
- 20 marks for the regular lab exercises and internal exam.
- 5 marks for the mini project-cum-design exercise(s).

# NETWORKING LAB

| | | |
|---|---|---|
| Subject Code : EC 3331 | Instruction : 2 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : 50 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • Provides comprehensive coverage of networking topics, from fundamentals to advanced applications and services, while providing opportunities for hands-on practical experience and career skills development. | **At the end of the course students will be able to:**<br>• Implementation of IP addressing schemes and different subnetting scenarios.<br>• Perform basic configurations of networking devices like switches and routers and<br>• Building and implementation of simple networking topologies and troubleshooting the networks.<br>• Implementation of virtual LANs and inter-VLAN routing.<br>• Implementation of different routing protocols like RIPv1, RIPv2, single-area and multi-area OSPF. |

1. Packet Tracer - Network representation.
2. Configuring Initial Switch Settings.
3. Investigating the TCP/IP and OSI models in action.
4. Explore a Network.
5. Identifying Network Devices and Cabling.
6. Connecting Wired and Wireless LAN.
7. Configure Initial Router Settings.
8. Investigate Unicast, Broadcast and Multicast Traffic.
9. Configuring IPv4 & IPv6 Addressing.
10. Troubleshooting ipv4 and ipv6 Addressing.
11. Subnetting Scenario 1.
12. Subnetting Scenario 2.
13. Implementing a Subnetted IPv6 Addressing Scheme.
14. DNS and DHCP.
15. Configuring a Linksys Router.
16. Skills Integration Challenge-module 1.

# DEPARTMENT OF
# ELECTRONICS & COMMUNICATION ENGINEERING

**Scheme of Instruction**
**and**
**Syllabi of**

## B.E. (ECE)

## III/IV - II Semester

**(With effect from 2017-2018)**


**VASAVI COLLEGE OF ENGINEERING**
**(Autonomous Institution Under UGC)**
**Ibrahimbagh, Hyderabad - 500 031.**
Telangana.

# VASAVI COLLEGE OF ENGINEERING
## SCHEME OF INSTRUCTION AND EXAMINATION

## B.E. III/IV – II SEMESTER

| S. No. | Code | Subject | Scheme of Instruction | | | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods / week | | | | Duration in Hrs. | Maximum Marks | | |
| | | | L | T | D | P | | Sem. Exam | Sessio -nals | |
| THEORY | | | | | | | | | | |
| 1 | EC 3160 | Digital Communication | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 2 | EC 3170 | Digital Signal Processing | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 3 | EC 3180 | Antennas and Wave Propagation | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 4 | EC 3190 | Computer Organization & Architecture | 3 | 1 | - | - | 3 | 70 | 30 | 3 |
| 5 | HS 3120 | Managerial Economics and Accountancy | 3 | - | - | - | 3 | 70 | 30 | 3 |
| 6 | HS 3140 | HVPE– II | 1 | - | - | - | 3 | 70 | 30 | 1 |
| 7 | EC 32XX | FS - IV : Technical Skills | 1 | 1 | - | - | 1.5 | 35 | 15 | 1 |
| 8 | HS 3210 | FS - IV : Soft Skills | 1 | 1 | - | - | 1.5 | 35 | 15 | 1 |
| PRACTICALS | | | | | | | | | | |
| 9 | EC 3411 | Analog & Digital Communication Lab | - | - | - | 3 | 3 | 50 | 25 | 1 |
| 10 | EC 3421 | Digital Signal Processing Lab | - | - | - | 3 | 3 | 50 | 25 | 1 |
| 11 | EC 3431 | Mini Project | - | - | - | 2 | - | - | 25 | 1 |
| | Total | | 18 | 6 | - | 8 | | 590 | 285 | 21 |
| | Grand Total | | 32 | | | | | 875 | | |

# DIGITAL COMMUNICATION

| | | |
|---|---|---|
| Subject Code : EC 3160 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To understand the building blocks of digital communication system.<br>• To analyze error performance of a digital communication system in the presence of noise.<br>• To study various source coding and channel coding techniques.<br>• To understand the concept of spread spectrum communication system | **At the end of the course students will be able to:**<br>• Compare digital modulation techniques and their performance.<br>• Understand different analog to digital conversion in different applications<br>• Assess entropy and efficiency of source coding techniques.<br>• Design block codes, convolution & cyclic codes.<br>• Analyze spread spectrum modulation techniques their acquisition and tracking circuits. |

**UNIT – I**

Elements of Digital Communication System, Comparison of Digital and Analog Communication Systems. Analog to Digital Conversion, Quantization and Encoding techniques, PCM. Companding in PCM systems: μ-law and A-law. Applications of PCM: PCM-TDM. Introduction to Linear Prediction Theory. Modulation and demodulation of DPCM and DM. Quantization noise and Slope overload error in DM. Modulation and demodulation of ADM. Comparison of PCM, DPCM, DM and ADM. SNR of PCM and DM. Vocoders.

**UNIT – II**

Uncertainty, Information and entropy. Source coding, Shannon – Fano algorithm and Huffman coding. Discrete memoryless channels, Probability relations in a channel, priori & posteriori entropies, cascaded channels, mutual information, Channel capacity, information rate and information capacity. Rate distortion.

**UNIT – III:**

Types of transmission errors, need for error control coding, Linear Block Codes (LBC): description of LBC, generation, Syndrome and error detection, minimum distance of a block code, error correcting and error detecting capabilities, Standard array and syndrome decoding, Hamming codes. Binary cyclic codes (BCC): description of cyclic codes, encoding, decoding and error correction of cyclic codes using shift registers, BCH codes. Convolution codes: description, encoding and decoding.

**UNIT – IV:**

Base band digital data transmission, error probability, matched filter, correlation receiver, coherent and non-coherent ASK, FSK, PSK, DPSK and QPSK, and error probability. Need for MSK, Modulation, Comparison of digital carrier modulation schemes. M-ary signaling schemes. Synchronization methods.

**UNIT – V**

Need for spreading a code, generation and characteristics of PN sequences. Direct Sequence Spread Spectrum and Frequency hopping spread spectrum systems and their applications. Acquisition schemes for spread spectrum receivers, Tracking of FH and DS signals.

**Suggested Reading:**


1. Simon Haykin, "*Communication Systems*," 4/e, Wiley India, 2011.
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "*Principles of Communication Systems*," 3/e, TMH, 2008.
3. P. Ramakrishna Rao, "*Digital Communication*," 1/e, TMH, 2011.
4. A. Bruce Carlson and Paul B. Crilly, "*Communication Systems*," 5/e, 2011.
5. Sam Shanmugham.K., "*Digital and Analog Communication Systems*," Wiley, 1979.

# DIGITAL SIGNAL PROCESSING

| | | |
|---|---|---|
| Subject Code : EC 3170 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • Students will apply FFT algorithms, discuss various design methods of FIR & IIR filters, describe the concepts of multirate signal processing and identify important features of TMS 320C 54XX DSP processors. | **At the end of the course students will be able to:**<br>• Apply the knowledge FFT Algorithms for computation of DFT.<br>• Design FIR & IIR filters using various methods.<br>• Analyze the effects of finite word length in digital filters.<br>• Apply decimation and interpolation concepts for the design of sampling rate converters.<br>• Study TMS320C54XX DSP processors for the design of digital filters. |

**UNIT – I**

Fast Fourier Transform : Overview of Discrete time Fourier Transform (DTFT), Discrete Fourier transform (DFT), – Efficient computation of DFT- Properties of DFT .

FFT algorithms –Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms - in place computation- bit reversal- Use of FFT algorithms in Linear Filtering and Correlation.

**UNIT – II**

Digital filters (FIR) Design: Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Bartlet, Hamming, Blackman, Kaiser – realization and finite word length effects.

**UNIT – III**

Digital filters (IIR) Design: Butterworth and Chebychev approximation- IIR digital filter design techniques- Impulse Invariant transformation - Bilinear transform techniques- Digital Butterworth- Chebychev filters,-comparisons between FIR and IIR filters. Digital filters structures.

**UNIT – IV**

Multirate Digital Signal Processing : Introduction -Decimation by a Factor D- Interpolation by a Factor I- Sampling Rate Conversion by a Rational Factor I/D- Implementation of Sampling Rate Conversion- Multistage implementation of Sampling Rate Conversion- Sampling Rate Conversion by an Arbitrary factor- Application of Multirate Signal Processing.

**UNIT – V**

Introduction to DSP Processors: Difference between DSP and other microprocessors architectures- their comparison and need for ASP, RISC and CPU- General purpose DSP processors- TMS 320C 54XX processors, architecture, addressing modes-instruction set.

**Suggested Reading:**


1. Alan V. Oppenheim & Ronald W. Schafer, "*Digital Signal Processing*," PHI, 2/e, 2010.
2. John G. Proakis & Dimtris G. Manolakis, "*Digital Signal Processing Principles, Algorithms and Application*," PHI, 3/e, 2000.
3. Ashok Ambardar, "*Digital Signal Processing: A Modern Introduction*," Cengage Learning, 2009.
4. Li Tan, "*Digital Signal Processing: Fundamentals and Applications*," Elsevier, 2012.
5. B.Venkataramani & M. Bhaskar, "*Digital Signal Processor Architecture, Programming and Application*," TMH, 2002.

# ANTENNAS AND WAVE PROPAGATION

| | | |
|---|---|---|
| Subject Code : EC 3180 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • Students will understand antenna fundamentals and parameters<br>• Study the working of antennas at different frequencies<br>• Acquire the knowledge of different modes of wave propagation | **At the end of the course students will be able to:**<br>• Apply principles of electromagnetics to explain antenna radiation<br>• Identify basic antenna parameters<br>• Design and analyze wire antennas, antenna arrays and aperture antennas<br>• Demonstrate the ability to measure antenna parameters<br>• Identify and describe effects of atmosphere on radio wave propagation |

**UNIT – I**

Principles of radiation, retarded potential and isotropic radiator, Basic antenna parameters: patterns, radiation intensity, far field, near field, Gain and directivity, Antenna Polarization, effective aperture, aperture efficiency. Point sources, Current distribution, infinitesimal dipole.

**UNIT – II**

Half-wave dipole, quarter wave monopole, Effect of earth on vertical patterns, Loop antenna, Far field pattern of circular loop with uniform current. Helical Antennas: Axial mode pattern, wideband characteristics, radiation efficiency, Q, Bandwidth, S/N ratio.

**UNIT – III**

Arrays of point sources, two element array with equal and unequal amplitudes, different phases. Linear array with uniform distribution, binomial array, principle of pattern multiplication. Broadside and End fire arrays, effect of inter element phase shift on beam scanning.

**UNIT – IV**

VHF,UHF turnstile antennas, Rhombic Antenna, Yagi - Uda Array, Log periodic Antenna, Horn, Parabolic Reflector, Lens antennas. Microstrip antennas: different types, advantages and disadvantages of Microstrip antennas (Working principle and characteristics only).

Antenna Measurements: Antenna Test Site, impedance, radiation pattern and gain measurement techniques, Antenna temperature.

**UNIT – V**

Ground wave propagation, Space and Surface waves, Tropospheric refraction and reflection, Duct propagation, Sky wave propagation, Regular and irregular variations in ionosphere. Friis transmission formula, Line of sight propagation.

**Suggested Reading:**


1. John D. Krauss, Ronald J. Marhefka & Ahmad S. Khan, "*Antennas and Wave Propagation*," 4/e, TMH, 2010.
2. Constantine A. Balanis, "*Antenna Theory: Analysis and Design*," 3/e, John Wiley, 2005.
3. Edward C. Jordan and Kenneth G. Balmain, "*Electromagnetic Waves and Radiating Systems*," 2/e, PHI, 2001.
4. Chatterjee, R., "*Antenna Theory and Practice*," New Age Publishers, 2008.

# COMPUTER ORGANIZATION AND ARCHITECTURE

| | | |
|---|---|---|
| Subject Code : EC 3190 | Instruction : 3+1 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To understand the organization of various units of computer and implement different algorithms for fixed point and floating point numbers.<br>• To analyse and design different types of processors including Hardwired CPU, MCU and Parallel Processors.<br>• To study the communication between CPU and I/O, Memory units. | **At the end of the course students will be able to:**<br>• Apply digital engineering fundamentals to acquire knowledge of arithmetic algorithms for different processors.<br>• Analyze the performance of hardwired control and Micro programmed Control unit organization<br>• Implementing the techniques of pipelining and parallelism to analyze the performance of a Processor.<br>• Interpret various techniques for efficient memory utilization to develop a system application.<br>• Apply the conceptual knowledge of system development with appropriate I/O Interface. |

**UNIT – I**

Data representation and Computer arithmetic: Introduction to Computer Systems, Organization and architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations.

**UNIT – II**

Basic Computer organization and Design: Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Micro programmed Control organization, address sequencing, micro instruction format and microprogram sequencer.

**UNIT – III**

Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, Data transfer and manipulation, Program control. CISC and RISC: features and comparison. Pipeline and vector Processing , Parallel Processing, Pipelining, Instruction Pipeline, Basics of vector processing and Array Processors.

**UNIT – IV**

Input-output organization: I/O interface. I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor , CPU-IOP communication, I/O channel.

**UNIT – V**

Memory organization: Memory hierarchy, Primary memory, Auxiliary memory, Associative memory, Cache memory: mapping functions, Virtual memory: address mapping using pages, Memory management.

**Suggested Reading:**


1. Morris Mano, M., "*Computer System Architecture*," 3/e, Pearson Education, 2005.
2. Hamacher, Vranesic, Zaky, "*Computer Organization*," 5/e, McGraw Hill, 2007.
3. William Stallings, "*Computer Organization and Architecture: Designing for performance*," 7/e, Pearson Education, 2006.
4. John P. Hayes, "*Computer Architecture and Organization*," 3/e, TMH, 1998.
5. Govindarajulu, B., "*Computer Architecture and Organization*," 2/e, TMH, 2010.

# MANAGERIAL ECONOMICS AND ACCOUNTANCY

| | | |
|---|---|---|
| Subject Code : HS 3120 | Instruction : 3 Periods per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 03 |

| Course Objective: | Course Outcomes |
|---|---|
| • To create an awareness about the significance of economics in day to day life and its impact of policies of organizations.<br>• Helps in engineering the products according to the societal needs<br>• Helps in leaning the investment decision making<br>• To understand the economical ways of production and pricing the products based on the market structures<br>• To analyse the performance of companies | **At the end of the course students will be able to:**<br>• Make decisions in solving the economic problems of the organization<br>• Make better sale of the product with customer centered products and services<br>• Make economical production by identifying the optimum combination of inputs and price them appropriately for better profits<br>• Understand the process of making long term investment decisions involving huge outlay<br>• Analyse the past performance of the company and make decisions for future and will be competent to set up own enterprise. |

**UNIT – I**

**Meaning and Nature of Managerial Economics: Branches of economics – micro and macro,** Managerial Economics – nature, scope, importance, relation with other sciences and its usefulness to Engineers, Fundamental Concepts of Managerial Economics - Scarcity, Marginalism, Equi-marginalism, opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

**UNIT - II**

**Consumer Behaviour:** Demand – concept, Determinants, Law of demand, relationship between total revenue, marginal revenue and demand, Elasticity of Demand (Price, Income Cross-Elasticity and advertising elasticity); Demand forecasting, Law of Supply, concept of Equilibrium. (Theory questions and small numerical problems on measurement of arc and point elasticity can be asked).

**UNIT - III**

**Theory of Production and Markets:** Production Function, Law of Variable Proportion, Isoquants, Economies of Scale, Cost analysis - cost concepts, Cost-Output relationship,
Optimization of employment of inputs, Break-Even Analysis, market structures – types, Price-Output determination under Perfect Competition and Monopoly (theory and problems can be asked on breakeven point).

**UNIT - IV**

**Capital Management:** Significance, Introduction to capital budgeting, traditional methods and discounted cash flow methods, determination and estimation of working capital requirements, sources of capital, (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

**UNIT - V**

**Book-Keeping:** Principles of Double entry system of Book keeping, Journal, Three column cash book and petty cash book, Bank reconciliation statement, Trial Balance, Preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios (liquidity, solvency and profitability ratios).
(theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios and analysis).

**Suggested Reading:**


1. Mehta P.L., “Managerial Economics – Analysis, Problems and Cases”, Sulthan Chand & Son’s Educational publishers, 2011.
2. Maheswari S. N. “Introduction to Accountancy”, Vikas Publishing House, 2005.
3. Financial Management by Khan & Jain. Mc. Graw Hill Education
4. W. Chris lewis & Craig H Petersen “Managerial economics”.
5. Modern Accounting by A. Mukherjee & M.Hanif
6. Micro Economics by M. L.Seth.
7. Financial Accounting by Jain & Narang.
8. Panday I.M. “Financial Management” Vikas Publishing House, 2009.

# HUMAN VALUES AND PROFESSIONAL ETHICS – II

| | | |
|---|---|---|
| Subject Code : HS 3140 | Instruction : 1 Period per week | Sessionals Marks : 30 |
| SEM Exam Marks : 70 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| **The course will enable the students to** :-<br>• Get a holistic perspective of value- based education.<br>• Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations.<br>• Understand professionalism in harmony with self and society.<br>• Develop ethical human conduct and professional competence.<br>• Enrich their interactions with the world around, both professional and personal. | **At the end of the course students will be able to:**<br>• Gain a world view of the self, the society and the profession.<br>• Make informed decisions.<br>• Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals<br>• Inculcate Human values into their profession.<br>• Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems.<br>• Strike a balance between physical, mental, emotional and spiritual parts their being.<br>• Obtain a holistic vision about value-based education and professional ethics. |

**UNIT-I**

A. **DISTINCTION BETWEEN NEED AND GREED**
Exercising the wisdom to distinguish need from greed.

B. **IDEAL SELF-REAL SELF**-
How to define the ideal-idealism at various levels- is it possible to reach idealism –Man as a pilgrim on a journey to idealism.

**UNIT - II**

A. **RIGHTS AND RESPONSIBILITIES**-Educating an individual about rights and responsibilities –Safeguards-Stimulants-Social Justice-The three catalysts for deciding rights and responsibilities.

B. **IMBIBING AND INCULCATING CIVIC SENSE AND CIVIC-VIRTUES**, The true meaning of Integrity - Honesty, Humility, Openness, Transparency, Dedication, Reliability, Confidentiality, accountability, Collegiality, Sympathy, Trustworthiness, Co-operation, Courage.
   a. The moral dilemma of the Modern world, Respect for Self, Others and Work.
   b. Respect for women at the workplace.

**UNIT - III**

**MANAGING FAILURE**-Identifying causes for failure and learning lessons-Using failure to score success-Role of self-confidence and personal ethics in coping with failure.

| | |
|---|---|
| • Anger/ Depression<br>• Fear<br>• Agitation<br>• Failure<br>• Lethargy<br>• Dishonesty | • Cruelty<br>• Jealousy<br>• Desire<br>• Cheating<br>• Pride<br>• Greed<br>• Lying |

**UNIT - IV**

**STRESS MANAGEMENT**- Identifying sources and levels of stress –Tackling stress and its associated negativity-Positive aspect of coping with stress- Some techniques to manage stress.

**UNIT - V**

**DEVELOPING EMOTIONAL INTELLIGENCE**

Self-Awareness
Handling Emotions
Motivation
Empathy
Social skills

**Suggested Readings:**


1. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, 2003 Human values, New Age International Publishers.
3. EG Seebauer & Robert L. Berry,2000,Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning
6. Caroline whitback < Ethics in Engineering Practice and Research, Cambridge University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning
8. Charles D.Fleddermann, " Engineering Ethics", Pearson Education /Prentice Hall, New Jersey,2004 (Indian Reprint)


**Online Resources**

1. Value Education website, Http://www.universalhumanvalues.info
2. UPTU website, Http://www.uptu.ac.in
3. story of stuff, Http://www.storyofstuff.com
4. AlGore, As Inconvenient Truth, Paramount Classics ,USA
5. Charlie Chaplin, Modern Times, United Artists, USA
6. IIT Delhi, Modern Technology-The Untold story
7. Anand Gandhi, Right Here Right Now, Cyclewala production

## FINISHING SCHOOL – IV : TECHNICAL SKILLS

## APPLICATIONS OF JAVA

| | | |
|---|---|---|
| Subject Code : EC 3220 | Instruction : 1+1 Periods per week | Sessionals Marks : 15 |
| SEM Exam Marks : 35 | SEM Exam Duration : 1.5 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • To familiarize the students with advanced Java programming concepts, simple graphical user interfaces, examine case studies and have practice in developing small-scale programs ,which is done using Object Oriented Programming techniques to develop Java applications in a Windows based environment | **At the end of the course students will be able to:**<br>• Write good java programs in GUI using SWING and handling different kinds of event on it including applying the concepts of multithreading.<br>• Update and retrieve the data from the databases using SQL<br>• Implements a data tier based on JDBC.<br>• Analyze business tier and business logic based on EJB<br>• Ability to implements a web tier using Java Servlets and JSP supporting Java Beans and RMI. |

**UNIT – I**

Working with Databases: Introduction to SQL and Relational Databases, Using java with databases: Java and CGI calls, JDBC API, Server side database Access. IO streams, IO exceptions.

**UNIT – II**

**Files -** streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class.

**Connecting to Database -** JDBC Type 1 to 4 drives, connecting to a database, querying a database and processing the results, updating data with JDBC.

**UNIT – III**

Package Java. net: Datagram Packet, Datagram socket, Inet Address, Server Socket, Socket, URL, and URL Connection.

**UNIT – IV**

Introduction to CGI, PERL, SERVELETS, RMI, SWINGS, CORBA, EJB, activeX.

**Suggested Reading**


1. Thomas. A. Powell, *HTML- The Complete Reference*, TMH, 2002.
2. Herbert Schildt, *JAVA – The Complete Reference*, TMH, 2014 9th edition
3. Robert Orfali and Donharkey, *Client Server Programming with JAVA and CORBA*, John Wiley, 2nd ed., 1998.
4. Comer, *Internet Book – everything you need to know about computer networking & How Internet Works*, 3rd PHI, 2002

## FINISHING SCHOOL – IV : TECHNICAL SKILLS

## CUSTOMER RELATIONSHIP MANAGEMENT (CRM), BUSINESS PROCESS MANAGEMENT (BPM)

| | | |
|---|---|---|
| Subject Code : EC 3230 | Instruction : 1+1 Periods per week | Sessionals Marks : 15 |
| SEM Exam Marks : 35 | SEM Exam Duration : 1.5 Hours | Credits: 01 |

| **Course Objectives** | **Course Outcomes** |
|---|---|
| **The course will enable the students to:** | **At the end of the course student will be able to:** |
| This Course is intended for System Architect candidates who want to create Pega 7.2 Case-Management solutions. | • Use Pega 7.2 tool and technology to rapidly prototype a simple case-management application.<br>• Create case stages and steps, implement processes, define properties, create a user interface, and create business rules and processes.<br>• Use and create Declare Expression Rules and use Declarative Rules Inspector.<br>• Implement business policies with decision rules.<br>• Define best practices and design patterns for implementing case-based business applications. |

**UNIT - I**

Pega's Business Application Platform: The Pega Platform, Principles of application development, Best practices and guardrails

Prototyping an Application using Pega Express: Designing a case life cycle, Assigning work, Enforcing service levels, Creating user views.

Case Design using Designer Studio: Requirements management, Managing case life cycle exceptions, Adding optional business process events, Sending correspondence, Guiding users through a business process, Designing complex process flows.

**UNIT - II**

Report Planning and Design: Process visibility through business reporting

Application Design: The role of the system architect, The building blocks of a Pega application, Accessing applications, Assessing guardrail compliance

Case Design: Creating cases and child cases

**UNIT - III**

Dta Model Design: Data elements in Pega applications, Setting property values automatically, Setting property values declaratively, Passing data to another case, Reviewing application data

Process Design: Activities, Configuring a work party, Configuring a service level agreement, Routing assignments, Configuring correspondence, Circumstancing rules.

**UNIT - IV**

Decision Design: Automated decisions in Pega applications, Configuring when rules, Configuring decision tables and decision trees

UI Design: Designing a UI form, Reusing text with paragraph rules, Configuring responsive UI behavior, Designing a dynamic UI, Validating user data

**UNIT - V**

Report Design: Creating reports, Optimizing report data,

Data Management:

Caching data with data pages, Managing reference data, Integration in Pega applications, Creating a connector.

Application Debugging: Debugging Pega applications

**Reference:**

https://pdn.pega.com/

# FINISHING SCHOOL – IV : SOFT SKILLS

| | | |
|---|---|---|
| Subject Code : HS 3210 | Instruction : 1+1 Periods per week | Sessionals Marks : 15 |
| SEM Exam Marks : 35 | SEM Exam Duration : 1.5 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| This course aims at enhancing the employability skills. Students will be trained in higher order thinking skills including analytical skills, problem solving skills and critical & logical reasoning skills. Students will be trained to work systematically and develop logical and analytical thinking.<br>Students will be trained in the following areas<br>1. Critical and Non verbal reasoning<br>2. Pure Maths<br>3. Verbal ability<br>4. Logical reasoning<br>5. Data Interpretation and Analysis | **At the end of the course students will be able to:**<br>• Understand the fundamentals concepts of Aptitude and verbal skills<br>• Solve questions using short cuts and smart methods<br>• Perform calculations with speed and accuracy<br>• Develop Analytical thinking and problem solving skills |

**UNIT I: VERBAL ABILITY**

- Finding errors
- Vocabulary
- Synonyms
- Antonyms
- Idioms and Phrases
- Fill in the blanks and sentence Jumbles
- Reading comprehension

**UNIT II : LOGICAL REASONING**

- Logical Reasoning
- Assignments
- Puzzles
- Blood relations
- Syllogisms

**UNIT III : CRITICAL AND NON VERBAL REASONING**

- Critical Reasoning
- Non verbal reasoning
- Figure series and completions

**UNIT IV : QUANTITATIVE APTITUDE - PURE MATHS**

- Pure maths
- Algebra
- Probability
- Permutations and combinations

**UNIT V: DATA INTERPRETATION AND ANALYSIS**

- Data Interpretation
- Line graph
- Pie chart
- Bar Graph
- Tabulations

# ANALOG AND DIGITAL COMMUNICATION LAB

| | | |
|---|---|---|
| Subject Code : EC 3411 | Instruction : 3 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : 50 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • To apply the knowledge of Analog communication to perform different Analog modulation schemes and calculate modulation index.<br>• To analyse the various digital modulation techniques.<br>• To study different Analog and digital multiplexing techniques. | **At the end of the course students will be able to:**<br>• Apply the knowledge of modulation & demodulation to different modulation techniques<br>• Analyze modulation & demodulation of PCM<br>• Analyze modulation & demodulation of Delta modulation<br>• Estimate the modulation & demodulated output of ASK, FSK, PSK.<br>• Study the working of modem. Measure attenuation, NA, losses of optical fiber cable. |

## (A) Experiments on Analog Communication

1. AM, FM generation and detection
2. Balanced Modulator
3. Pre emphasis and De-emphasis circuits
4. Radio Receiver Measurements: Sensitivity, Selectivity and Fidelity
5. Sampling and reconstruction
6. PAM, PWM, and PPM generation and detection
7. Time Division, Frequency Division Multiplexing and De-multiplexing
8. PLL Characteristics
9. Spectral Analysis of Video signals generated by TV demonstrator Kit and Pattern Generator using Spectrum analyzer
10. Mixer Characteristics

## (B) Experiments on Digital Communication

1. PCM generation and detection
2. Error control coding
3. Data formats / channel encoding and decoding.
4. Linear Delta, Adaptive Delta Modulation and Demodulation.
5. ASK, FSK, BPSK & QPSK generation and Detection.
6. Minimum Shift Keying generation & detection
7. Optical Fibre measurements:
   Numerical aperture, Attenuation, E-O and O-E characteristics
8. Digital Fibre Optic Multiplexed Link
9. Modem characteristics.
10. Wavelength Division Multiplexing

**Note:**

1. Minimum of **5** from Part A and **5** from Part B is mandatory.

## DIGITAL SIGNAL PROCESSING LAB

| | | |
|---|---|---|
| Subject Code : EC 3421 | Instruction : 3 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : 50 | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • Students will design and develop digital systems using MATLAB and Code Composer Studio Environment. | **At the end of the course students will be able to:**<br>• Develop MATLAB files for the verification of system response.<br>• Design digital filters using various methods.<br>• Implement a Multirate Signal Processing System.<br>• Design and implement digital filter Code Composer Studio and Digital Signal Processing Kits. |

### (A) Experiments on DSK and CCS

1. Solutions of difference equations
2. Impulse Response
3. Linear Convolution.
4. Circular Convolution
5. Study of procedure to work in real- time.
6. Fast Fourier Transform Algorithms: (DIT, DIF)
7. Design of FIR (LP/HP) using windows, (a)Rectangular, (b)Triangular (c) Hamming window
8. Design of IIR (HP/LP) filters.

### (B) Experiments on signal processing.

1. DFT and FFT algorithm
2. Linear Convolutions
3. Circular Convolutions
4. FIR filter design using different data windows
5. IIR filter design: Butter worth, chebysheve type 1 and 2 and Bilinear transformation Methods.
6. Interpolation and Decimation.

**Note:**

1. Minimum of **5** from Part A and **5** from Part B is mandatory.

2. For section 'B', MATLAB with different toolboxes like Signal Processing, Signal Processing block set, and SIMULINK/ MATHEMATICA/ any popular software can be used.

# MINI PROJECT

| | | |
|---|---|---|
| Subject Code : EC 3431 | Instruction : 2 Periods per week | Sessionals Marks : 25 |
| SEM Exam Marks : -- | SEM Exam Duration : 3 Hours | Credits: 01 |

| Course Objective: | Course Outcomes |
|---|---|
| • To make the students realize the application value of what they have studied till then.<br>• The students would be made to know the importance of sequential thinking that is needed to achieve a specified goal.<br>• This is a prelude to take up a major project in their final year. | **At the end of the course students will be able to:**<br>• Take up projects of good quality and application value<br>• Acquire skills to apply their knowledge in a multi-dimensional environment to solve problems of interdisciplinary nature.<br>• Take up projects of social relevance and investigate academic issues and challenges in their implementation. |

The Students are required to carry out Mini Project one or more of the areas such as

- Linear and Digital Integrated Circuits,
- Analog and Digital Communication
- Microprocessor and Microcontrollers
- Control and Instrumentation
- Digital Signal Processing
- Antennas

Students are required to submit a report on the Mini Project at the end of the Semester.