### IV Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UMAXXXC</td>
<td>Engineering Mathematics IV</td>
<td>4.0</td>
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<tr>
<td>2</td>
<td>UEC412C</td>
<td>Signals and Systems</td>
<td>4.0</td>
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<tr>
<td>3</td>
<td>UEC413C</td>
<td>Linear Integrated Circuits</td>
<td>4.0</td>
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<tr>
<td>4</td>
<td>UEC414C</td>
<td>8051 Microcontroller and Embedded Systems</td>
<td>4.0</td>
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<tr>
<td>5</td>
<td>UEC415C</td>
<td>Analog Communication</td>
<td>3.0</td>
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<tr>
<td>6</td>
<td>UEC416H</td>
<td>Human Resource Management II</td>
<td>3.0</td>
</tr>
<tr>
<td>7</td>
<td>UEC417L</td>
<td>Signals and Systems Lab</td>
<td>1.5</td>
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<tr>
<td>8</td>
<td>UEC418L</td>
<td>Microcontroller Lab</td>
<td>1.5</td>
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<tr>
<td>9</td>
<td>UMAXXXC</td>
<td>Advanced Mathematics II</td>
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<td><strong>Total</strong></td>
<td></td>
<td><strong>25</strong></td>
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<tr>
<td>Unit I</td>
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<tr>
<td>Introduction: Definition of signals and systems, sampling theorem (qualitative approach), classification of signals, elementary signals, basic operations on signals, interconnection of systems and operations, properties of systems.</td>
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<tr>
<th>Unit II</th>
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<tbody>
<tr>
<td>Time domain representation of LTI systems: Convolution sum, convolution integral, impulse response representation. Properties of impulse response, block diagram representation of discrete time and continuous time systems.</td>
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<thead>
<tr>
<th>Unit III</th>
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<tbody>
<tr>
<td>Introduction to Fourier representation of different signals, orthogonality of complex sinusoidal signals. Fourier and inverse Fourier representation of signals: Continuous time Fourier series, continuous time Fourier transform, DTFS and DTFT, and properties of DTFT.</td>
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<table>
<thead>
<tr>
<th>Unit IV</th>
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</table>
Text Book:

Reference Books:

Course Title: Linear Integrated Circuits and Its Applications
Course Code: UEC413C

<table>
<thead>
<tr>
<th>Credits: 4</th>
<th>Teaching Hours: 52 Hrs (13 Hrs/Unit)</th>
<th>Contact Hours: 4 Hrs/Week</th>
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<tbody>
<tr>
<td>CIE Marks: 50</td>
<td>SEE Marks: 50</td>
<td>Total Marks: 100</td>
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Unit I
Introduction to operational amplifiers: Introduction, block diagram representation of a typical op-amp, types of integrated circuits, the ideal op-amp, equivalent circuit of an op-amp, ideal voltage transfer curve, open loop op-amp configurations.
### Unit II

An op-amp with negative feedback: Block diagram representation of feedback configuration, voltage series feedback amplifier, voltage shunt feedback amplifier, differential amplifier.

The practical op-amp: Input offset voltage, input bias current, input offset current, total output offset voltage, thermal drift, effect of variation in power supply voltages on offset voltage, common mode configuration and common mode rejection ratio, Power supply rejection ratio.

Frequency response of an op-amp: Introduction, compensating networks, frequency response of internally compensated op-amps, frequency response of non compensated op-amps, high frequency op-amp equivalent circuit, open loop voltage gain as a function of frequency, closed loop frequency response, circuit stability, Slew rate.

### Unit III

General applications: DC and AC amplifiers, the peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter with grounded load, current to voltage converter, integrator, differentiator.

Active filters: First order and second order low pass butter worth filter, first order and second order high pass butter worth filter, higher order filters, band pass filter, band reject filters, all pass filters.

### Unit IV

Oscillators and waveform generator: Introduction, phase shift oscillator, Wien bridge oscillator, square wave generator, triangular wave generator, saw tooth wave generators, voltage controlled oscillator. Comparators and converters: Basic comparator, zero crossing detector, schmitt trigger, DAC with R-2R ladder network, ADC using successive approximation type, precision rectifiers, peak detector, sample and hold circuit.

Specialized IC applications: Working of 555 timer, timer as a monostable and astable multivibrators, operating principles of PLL.

### Text Book:

Reference Books:

2) David Bell, “Linear Op-amp applications”.

<table>
<thead>
<tr>
<th>Course Title: 8051 Microcontroller and Embedded Systems</th>
<th>Course Code: UEC414C</th>
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<td>Credits: 4</td>
<td>Contact Hours: 4 Hrs/Week</td>
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<tr>
<td>Teaching Hours: 52 Hrs (13 Hrs/Unit)</td>
<td>SEE Marks: 50</td>
</tr>
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<td>CIE Marks: 50</td>
<td>Total Marks: 100</td>
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</table>

Unit I

Introduction: Microprocessors and Microcontrollers, Introduction to embedded systems and microcontrollers. Common terminology associated with computing systems like hardware, software, firmware, memory, CPU address bus, data bus, control bus. General features of microcontrollers, MCS-51 family microcontrollers.
8051 Microcontroller: 8051 architecture, pin description of 8051, memory organization, basic registers, special function registers, register banks, I/O ports, bit addressable memory, stack, internal timing.
### Unit II

8051 Instructions and Programming: Programming model, addressing modes, types of instructions, instruction set, data move instructions, external data move instructions, arithmetic instructions, logical instructions, jump and call instructions, bit-addressable instructions, sample programs using all the above instructions and concepts.

### Unit III


### Unit IV

8051 Programming in C: Data types and time delay, I/O programming, Logic operations, Data conversion programs, data serialization. C programs on Timer/Counter, Interrupts and Serial Communication. Interfacing: Introduction, need for interfacing, single LED interfacing, interfacing the following devices using both assembly and embedded C-programming-LCD module, ADC/DAC, key-pad, stepper motor. Interfacing with the 8255: Programming the 8255, Interfacing the 8255, concepts of IDE (Integrated Development Environment).

### Text Book:


Reference Books:

3) Dr.Uma Rao and Dr.Andhe Pallavi, “The 8051 microcontroller architecture, programming and applications”, Pearson Education Sanguine.
4) Myke Predko, “Programming and Customizing the 8051 Microcontroller”, TMH.
Unit I

Linear modulation: Baseband and carrier communication, time domain and frequency domain description, generation and detection of AM waves. DSB-SC modulation: time and frequency domain representation, generation and detection of DSB-SC modulated waves. SSB Modulation: Time domain representation of SSB signal, generation and detection of SSB modulated waves, Quadrature Amplitude Modulation (QAM). Vestigial sideband modulation: Frequency domain representation, generation and detection of VSB, comparison of amplitude modulation techniques, super heterodyne receiver.

Unit II


Unit III

Pulse Modulation: Pulse Amplitude Modulation (PAM), natural sampling, instantaneous sampling, recovery, transmission of PAM signals, other forms of pulse modulation, Time Division Multiplexing (TDM), bandwidth of PAM signals.

Unit IV

Noise: Short noise, power density spectrum of short noise, thermal noise, white noise, equivalent noise bandwidth, behavior of AM, FM, PM in the presence of noise.
**Text Books:**


**Reference Books:**

Subject: Marketing Management UHS416C

Credits: 3 Credits (3-0-0)
Total Credit: 40

Unit I

Unit II

Unit III
Pricing Decisions: Objective of pricing, factors influencing pricing decision, pricing methods, pricing policies. Channel Decisions: nature and types of marketing channels, channel management decisions, retailing and whole selling.

Unit IV
Promotion Decisions: Promotion mix, advertising, sales promotion, personal selling, media buying and media planning. Marketing Audit and Control: Marketing audit and marketing control.

Text Books
Subject: Human Resource Management –UHS316C

Credits: 3 (3-0-0)

Unit I
10 Hrs

Unit II
10 Hrs

Unit III
10 Hrs

Unit IV
10 Hrs
International HRM: The growth of international business, HR and the international business challenge, effect of inter country difference on HRM, international staffing, international compensation and appraisal, international labour relations and Information Technology and HR.

Text Books
<table>
<thead>
<tr>
<th>Course Title: Signals and Systems Lab</th>
<th>Course Code: UEC417L</th>
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<tbody>
<tr>
<td>Credits: 1.5</td>
<td>Contact Hours: 3 Hrs/Week</td>
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<tr>
<td>CIE Marks: 50</td>
<td>SEE Marks: 50</td>
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<td>Total Marks: 100</td>
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</tbody>
</table>
List of Experiments

1) Basic MATLAB/SCILAB
   a. MATRIX Operations
   b. Input and Output operations and functions
   c. Loops in MATLAB/SCILAB
   d. 2-D Plotting techniques like XY plot, stem plot, log plot, stairs plot, bar plot, pie plot, histogram etc.
   e. 3-D Plotting techniques

2) Signals & Systems
   a. Generation of different types of continuous and discrete time signals
   b. Generation of typical signals like impulse, step, exponential, complex exponential, sinc etc.
   c. Basic operations on continuous and discrete time signals
   d. Impulse, step and ramp response of a differential equation
   e. Convolution of two discrete and continuous signals
   f. Fourier decomposition and reconstruction of signals
   g. DTFS of discrete time periodic signal x (n) and plot its magnitude and phase spectrum
   h. DTFT of discrete time a periodic signal x (n) and plot its magnitude and phase spectrum
   i. Verification of symmetry property of DTFT signal
   j. Z-transform of a given sequence and it’s pole zero plot
List of Experiments

1) Basic 8051 assembly language programs on the trainer kits using hand assembly.
   a. Move an 8-bit immediate data byte to a register/memory using all addressing modes.
   b. Exchange the content of internal and external memory locations.
   c. Stack operations with an example.
   d. Average of n-eight bit numbers.
   e. Delay programs.
   f. Code conversion programs.

2) Programs using in-built peripherals like timers/counters, interrupts and serial port using
   assembly /C programming and keil simulation.
   a. I/O port programming
   b. Generation of rectangular wave of different duty cycle using internal timers.
   c. Count external events using in-built counters.
   d. Serial transfer of a message at 9600 baud, 8-bit data, 1-stop bit.

3) Interfacing programs on 8051-based microcontroller kits using different interfacing modules
   like.
   a. Matrix keyboard interfacing
   b. LCD interface
   c. Logic controller interface
   d. Stepper motor interface
   e. ADC/DAC interface
   f. Usage of Keil software (Evaluation) and SPJ compiler and Debugger for assembly and
      embedded-C programming for all above assembly language programs.