B. E. SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING

III & IV SEMESTER

With
Scheme of Teaching
& Examination
<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Qualification</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Rajesh Shetty K.</td>
<td>Ph.D</td>
<td>Professor/HOD</td>
</tr>
<tr>
<td>2</td>
<td>Dr. M.K. Parasuram</td>
<td>Ph.D</td>
<td>Director</td>
</tr>
<tr>
<td>3</td>
<td>Prof. S. Chandrakanth Naik</td>
<td>M.S/MBA</td>
<td>Asso. Professor</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Rekha Bhandarkar</td>
<td>Ph.D</td>
<td>Professor</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Rathnamala Rao</td>
<td>Ph.D</td>
<td>Professor</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Ajay Singhal</td>
<td>Ph. D</td>
<td>Professor</td>
</tr>
<tr>
<td>7</td>
<td>Prof. H. Manjunath Pai</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>8</td>
<td>Mr. Durga Prasad</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>9</td>
<td>Mr. Mahaveera K.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
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<tr>
<td>10</td>
<td>Mrs. Sushma P.S.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>11</td>
<td>Mrs. Sunitha Lasrado</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>12</td>
<td>Mrs. Shrividya G.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>13</td>
<td>Mrs. Padmavathi K.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>14</td>
<td>Mrs. Vidya Kudva</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>15</td>
<td>Mrs. Prabha Niranjan</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd III</td>
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<tr>
<td>16</td>
<td>Mr. Satheesh Rao</td>
<td>M.Tech</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>17</td>
<td>Mr. Su kesh Rao M.</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>18</td>
<td>Mr. Ravindra K.S.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>19</td>
<td>Mr. Pradyumna G.R.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>20</td>
<td>Mrs. Roopa B. Hegde</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>21</td>
<td>Mrs. Usha Desai</td>
<td>M.Tech(Ph.D)</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>22</td>
<td>Mrs. Charishma</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>23</td>
<td>Mrs. Niju Rajan</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<tr>
<td>24</td>
<td>Mrs. Shubha B.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd II</td>
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<td>26</td>
<td>Mr. Anil Kumar Bhat</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>27</td>
<td>Ms. Ranjitha Ravindran</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>28</td>
<td>Ms. Ankitha Rao</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>29</td>
<td>Mr. Bomme Gowda</td>
<td>B.E(M.Tech)</td>
<td>Asst. Professor</td>
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<tr>
<td>30</td>
<td>Mrs. Deepa K.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>31</td>
<td>Mr. Dileep Kumar M.J.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>No.</td>
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<td>32</td>
<td>Mr. Abhilash. K.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd-I</td>
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<tr>
<td>33</td>
<td>Mr. Sudharshana</td>
<td>M.Tech</td>
<td>Asst. Prof Gd-I</td>
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<tr>
<td>34</td>
<td>Mr. Mahesh Kumar T.N.</td>
<td>M.Tech</td>
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<td>35</td>
<td>Mr. Shivakumar B. R.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<td>36</td>
<td>Mrs. Nagapriya Kamath K.</td>
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<td>37</td>
<td>Ms. Ramya Shetty</td>
<td>M.Tech</td>
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<td>38</td>
<td>Mr. Prajwal Hegde N.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<td>39</td>
<td>Mr. Karthik</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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<tr>
<td>40</td>
<td>Mrs. Anupama B.</td>
<td>M.Tech</td>
<td>Asst. Prof Gd I</td>
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</table>

**Department of E & C Engineering, NMAMIT, Nitte**

**Vision**

Empowering people, Partnering in Community Development by achieving expertise requiring the knowledge of state of the art technology in the field of Electronics and Communication.

**Mission**

To impart specialized education in the field of Electronics & Communication that contributes to the socio-economic development of the region and to generate technical manpower with high degree of credibility, integrity and ethical standards by providing vibrant learning environment.
Program: B.E. Electronics & Communication Engineering

Program Educational Objectives (PEO’s):

PEO1: The Graduate should have a solid Foundation in Mathematical, science and Electronics Engineering Fundamentals required to solve Electronics and Communication Engineering problems and also which will help to pursue higher Studies and life-long learning needed for a successful professional career.

PEO2: To inculcate in graduates professional, effective communication skills, teamwork Skills, multidisciplinary approach, and an ability to relate engineering issues to Broader social context.

Program Outcomes (PO’s):

PO1: Students will be able to identify, analyze and solve basic Electronics Engineering Problems, in Specific areas, by applying knowledge of Mathematics, science and Engineering with modern Engineering tools.

PO2: Students will demonstrate an ability to visualize and work on Laboratory and Multidisciplinary tasks.

PO3: Students will be able to understand engineering practice in the context of global, Economic, Environmental and societal realities
# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## SCHEME OF TEACHING

### III Semester:

<table>
<thead>
<tr>
<th>SL. NO</th>
<th>SUBJECT CODE</th>
<th>SUBJECTS</th>
<th>L+T+P+S</th>
<th>HRS./WEEK</th>
<th>CIE</th>
<th>SEE</th>
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<td>Vector Calculus and Transform Techniques</td>
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<td>3.</td>
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<td>Network Analysis</td>
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<td>Digital Electronic circuits</td>
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<td>Signals &amp; Systems</td>
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<td>Digital Electronic Circuits Lab</td>
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<td>Individual Effectiveness Lab</td>
<td>0+0+3</td>
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# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
## SCHEME OF TEACHING
### IV Semester:

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<tr>
<th>SL. NO</th>
<th>SUBJECT CODE</th>
<th>SUBJECTS</th>
<th>L+T+P+S</th>
<th>HRS./WEEK</th>
<th>CIE</th>
<th>SEE</th>
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<tbody>
<tr>
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<td>13EC401</td>
<td>Probability Theory and Numerical Methods</td>
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<td>Electronic Measurements and Transducers</td>
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<td>Electromagnetic Theory</td>
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<td>Analog communication</td>
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<td>Digital System Design Using VHDL</td>
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<td>Linear Integrated Circuits &amp; Application Lab</td>
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<td>Digital System Design Lab</td>
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<td>400</td>
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VECTOR CALCULUS AND TRANSFORM TECHNIQUES

Subject Code : 13EC301 Credits : 04
Hrs/Week : 4 Total Hours : 52

Prerequisites:
Vector algebra, infinite series, differentiation and integration, knowledge of complex numbers.

Course learning Objectives: At the end of the course the successful student is expected to:
1. Know the application of vector functions , vector differentiation and vector integration
2. Apply the results of topics like complex variables, Fourier Analysis, Z-transforms etc to solve engineering problems.

UNIT – I
Vector Calculus: Vector algebra, Vector differentiation- gradient, divergence, curl, laplacian, solenoidal and irrotational vectors, Curvilinear, Spherical & Cylindrical Co-ordinates. 10 Hrs

UNIT – II
Vector integration- Line, Surface & Volume integrals. Green’s, Gauss divergence & Stoke’s theorems. Applications. 8 Hrs

UNIT – III

UNIT – IV
Fourier Analysis: Periodic functions, Euler’s formulae, Fourier series of odd and even functions, functions with arbitrary period, half range series. Harmonic Analysis. Fourier integral theorem, Fourier Transforms, Inverse Fourier transform, Convolution theorem and Parseval’s identity. Fourier sine and Fourier cosine transforms, Inverse Fourier sine and Inverse Fourier cosine transforms. 12 Hrs
UNIT – V

**Z transforms:** Z-transform, standard forms, linearity property, damping rule, shifting rule. Inverse Z-transform, Finite differences and difference equations, Solving Difference equations using Z-transforms.

**TEXT BOOKS:**

**REFERENCE BOOKS:**

ANALOG ELECTRONIC CIRCUITS

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Credits</th>
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<tbody>
<tr>
<td>13EC302</td>
<td>04</td>
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<tbody>
<tr>
<td>4+0+0+2</td>
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UNIT - I

**DIODE APPLICATIONS:** Diffusion and Transition Capacitance, Load line analysis, Series diode configurations, parallel and series parallel configuration, AND/OR gates, Half & Full wave Rectification for sinusoidal inputs. Clippers and Clampers. Voltage doublers and triplers (self study)

**UNIT - II**

**TRANSISTOR BIASING:** Operating point, Fixed bias circuits, Emitter bias, Voltage divider bias, DC bias with voltage feedback, Design operations, Transistor switching networks, Derivation of stability factor S for various biasing techniques, Bias stabilization (self study)
UNIT - III

TRANSISTOR AT LOW FREQUENCIES: BJT transistor modeling, Hybrid equivalent model, CE Fixed bias configuration, Voltage divider bias, CE Emitter bias, Emitter follower, Collector feedback configuration.  

10 Hrs

UNIT - IV

GENERAL AMPLIFIERS: Cascade connections, Cascode connections, Darlington connections, Feedback pair

POWER AMPLIFIERS: Amplifier types, series fed class A amplifier, Transformer coupled Class A amplifiers, Class B amplifier operation, harmonic distortions in Class B amplifier.  

12 Hrs

UNIT - V

FEEDBACK AND OSCILLATOR CIRCUITS: Feedback concept, Feedback connection types, Practical feedback circuits, Oscillator operation, Phase shift oscillator, Tuned oscillator circuit (transistor only), Crystal oscillator (transistor only) (self study).  

8 Hrs

TEXT BOOK:


REFERENCE BOOKS:


NETWORK ANALYSIS

Subject Code : 13EC303  
Credits : 04

Hrs/Week : 4  
Total Hours : 52

UNIT - I

BASIC CONCEPTS: Practical sources, Source transformations, Network reduction using star- Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh.

NETWORK TOPOLOGY: Graph of a network, Concept of tree and co-tree, incidence matrix, tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, principle of duality.  
12 Hrs

UNIT - II

NETWORK THEOREMS- I: Superposition, Reciprocity and Millman’s theorems.
NETWORK THEOREMS -II: Thevinin’s and Norton’s theorems; Maximum Power transfer theorem  
12 Hrs

UNIT - III

RESONANT CIRCUITS: Series and parallel resonance, frequency response of series and parallel circuits, Q- factor, Bandwidth.
TRANSIENT BEHAVIOR AND INITIAL CONDITIONS: Behavior of circuit elements under switching condition and their representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.  
12 Hrs

UNIT - IV

LAPLACE TRANSFORMATION AND APPLICATIONS: Solution of networks, step, ramp and impulse responses, waveform synthesis.  
8 Hrs

UNIT - V

TWO PORT NETWORK PARAMETERS: Definition of z, y, h and transmission parameters, modeling with these parameters, relationship between parameters sets.  
8 Hrs
TEXT BOOKS:

REFERENCE BOOKS:

DIGITAL ELECTRONIC CIRCUITS

Subject Code : 13EC304  Credits : 04
Hrs/Week : 4  Total Hours : 52

UNIT - I

PRINCIPLES OF COMBINATIONAL LOGIC-1: Definition of combinational logic, Canonical forms, generation of switching equations from truth tables, Karnaugh maps-3, 4 variables, Incompletely specified functions (Don’t Care terms), Simplifying Max term equations.

PRINCIPLES OF COMBINATIONAL LOGIC-2: Quine-McCluskey minimization technique, Quine-McCluskey using don’t care terms, Reduced Prime Implicant Tables, Map entered variables.

12 Hrs

UNIT - II

ANALYSIS AND DESIGN OF COMBINATIONAL LOGIC - I: General approach, Decoders-BCD decoders, Encoders.

ANALYSIS AND DESIGN OF COMBINATIONAL LOGIC - II: Digital multiplexers- Using multiplexers as Boolean function

5
generators. Adders and subtractors - Cascading full adders, Look ahead carry, Binary comparators.

10 Hrs

UNIT - III


10 Hrs

UNIT - IV

SEQUENTIAL CIRCUITS – 2: Characteristic Equations, Registers, Counters - Binary Ripple Counters, Synchronous Binary counters, Counters based on Shift Registers, Design of Synchronous counters, Design of a Synchronous Mod-6 Counter using clocked JK Flip-Flops Design of a Synchronous Mod-6 Counter using clocked D, T, or SR Flip-Flops.

10 Hrs

UNIT - V

SEQUENTIAL DESIGN - I: Introduction, Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis.

SEQUENTIAL DESIGN - II: Construction of state Diagrams, Counter Design.

10 Hrs

TEXT BOOKS:

REFERENCE BOOKS:
SIGNALS & SYSTEMS

Subject Code : 13EC305    Credits : 04
Hrs/Week :  4   Total Hours : 52

UNIT - I

INTRODUCTION: Definitions of a signal and a system, classification of signals, basic operations on signals, elementary signals, systems viewed as interconnections of operations, properties of systems.

TIME-DOMAIN REPRESENTATIONS FOR LTI SYSTEMS – 1: Convolution, impulse response representation, convolution sum and convolution integral. 12 Hrs

UNIT - II

TIME-DOMAIN REPRESENTATIONS FOR LTI SYSTEMS – 2: properties of impulse response representation, differential equation representation (solution not included), difference equation representation and its solution, Block diagram representations.

FOURIER REPRESENTATION FOR SIGNALS – 1: Introduction, Discrete time and continuous time Fourier series (derivation of series excluded) and their properties. 12 Hrs

UNIT- III

FOURIER REPRESENTATION FOR SIGNALS – 2: Discrete and continuous Fourier transforms (derivations of transforms are excluded) and their properties. 8 Hrs

UNIT - IV

APPLICATIONS OF FOURIER REPRESENTATIONS: Introduction, Frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals. 10 Hrs
UNIT - V


Z-TRANSFORMS – 2: Transform analysis of LTI Systems, unilateral Z-Transform and its application to solve difference equations. 10 Hrs

TEXT BOOK:

REFERENCE BOOKS:
ANALOG ELECTRONIC CIRCUITS LAB

Subject Code : 13EC306          Credits : 2
Hrs/Week      : 3

LIST OF EXPERIMENTS

2. Testing of clamping circuits.
3. Verification of Thevenin’s theorem and maximum power transfer theorem.
4. To study series and parallel resonant circuits.
5. Design, study of a RC coupled single stage BJT amplifier.
6. Design and testing for the performance of BJT-RC phase shift oscillator.
7. Testing for the performance of BJT- Crystal oscillator.
8. Design and testing for the performance of BJT Hartley and Colpitt’s oscillator.
9. Design & testing of a BJT Darlington Emitter follower
10. Design & testing of a BJT feedback amplifier
DIGITAL ELECTRONIC CIRCUITS LAB

Subject Code : 13EC307
Hrs/Week : 3

Credits : 02

LIST OF EXPERIMENTS

1. Simplification, realization of Boolean expressions using logic gates/Universal gates.
2. Realization of Half/Full adder and Half/Full Subtractors using logic gates.
3. Realization of parallel adder/Subtractors
4. BCD to Excess-3 code conversion and vice versa.
5. Realization of Binary to Gray code conversion and vice versa
6. Use of MUX/DEMUX – for arithmetic circuits and code converter.
7. Realization of comparators.
8. Use of Decoder chip to drive LED display and Priority encoder.
10. Realization of counters as a sequential circuit and MOD – N counter design.
11. Shift left, Shift right, SIPO, SISO, PISO, PIPO operations.
12. Wiring and testing Ring counter/Johnson counter.
13. Wiring and testing of sequence generator.
INDIVIDUAL EFFECTIVENESS LAB

Subject Code : 13EC308  
Credits : 02
Hrs/Week : 3

Objectives

1. To help the students understand themselves. Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self-disclosure, receptivity to feedback and sensitivity to others.
2. To help the students identify their primary and secondary motivators – what drives them for achievement?
   a. Understanding the student’s need for achievement
   b. Understanding how positive expectations lead to positive results.
3. To help the students to develop a goal driven mindset and to take the first steps into individual personal planning, controlling and measuring results.
4. To make the students aware of importance of communication and typical barriers to communication.
5. To help the students develop effective oral communication skills.
6. To help the students develop effective written communication skills.
7. To help the students develop listening skills.
8. To help the students participate in group discussions.
9. To help the students develop effective business presentation skills.
10. To help the students receive feedback with an open mind, respond to feedback and take the action on them.
11. To help the students develop time management and organization skills.

Contents

Module 1: Know Yourself
Self assessment profilers to identify and assess the following – Identify and analyze personality/behavioral attributes of personal effectiveness – exploratory orientation, self disclosure, receptivity to feedback, sensitivity to others. 8 Hrs

11
Module 2: Achievement Motivation & Goal Setting
- Identifying primary and secondary motivators using a motivational profiler.
- Understanding need for achievement.
- Developing goal driven mindset.
- First steps into career planning. 8 Hrs

Module 3: Communication Skills
- Effective oral communication
- Effective written communication
- Constructing effective messages (memo, letters, e-mails)
- Writing persuasively
- Correspondence etiquettes – letters & email
- Importance of listening responsively
- Handling conversations
- Effective group discussions 15 Hrs

Module 4: Presentation Skills
- Understanding audience, presentation objectives, best practices & tools in preparation of presentation.
- Improving quality of presentation through better use of voice, eyes, gestures, visual aids.
- Presenting to groups
- Presenting one-on-one 13 Hrs

Module 5: Handling Feedback
- Seeking feedback
- Accepting feedback with an open mind
- Responding to feedback
- Actionizing feedback 6 Hrs

Module 6: Time Management
- Introduction to Time Management and importance of managing self
- Beating procrastination
- Action plans-starting to achieve in a small way
- Scheduling skills 6 Hrs

REFERENCE BOOKS:
2. Online reference materials provided as part of the Entry Edge program.
PROBABILITY THEORY AND NUMERICAL METHODS

Subject Code : 13EC401  Credits : 04
Hrs/Week : 4  Total Hours : 52

Prerequisites:
Set Theory, Calculus, differential equations and finite differences.

Course learning Objectives: At the end of the course the student will be able to
1. understand and appreciate probabilistic models for situations involving chance effect.
2. learn some probability distributions both discrete and continuous and its applications in real life problems.
3. apply numerical methods to solve engineering problems where the analytical solutions for some functions are not possible.

UNIT – I
Probability: Introduction to probability, finite sample space, conditional probability and independence. Baye’s theorem. One dimensional random variable: discrete and continuous random variable, probability distribution function, cumulative distribution function. Mean and variance. 10 Hrs

UNIT - II
Probability distributions and Two dimensional random variable: Binomial, Poisson, Normal, and Exponential distributions. Two and higher dimensional random variables, Joint probability distributions, marginal distributions. Expectation, covariance and correlation coefficient. 10 Hrs

UNIT - III
UNIT - IV

12 Hrs

UNIT – V

8 Hrs

TEXT BOOKS:

REFERENCE BOOKS:
LINEAR INTEGRATED CIRCUITS & APPLICATIONS

Subject Code : 13EC402  Credits : 04
Hrs/Week : 4  Total Hours : 52

UNIT - I

**Differential Amplifier:** Analysis of differential amplifier, common mode and differential mode gains, transfer characteristics, CMRR, I/P and O/P impedances, high performance amplifiers using current source bias and current mirror connection, super alpha multiplier.

**Drift Problem:** Thermal drift, input error signals and their compensation in differential amplifier.

**Operational Amplifier:** Ideal op-amp characteristics, cascading of differential amplifier, I/P, O/P stages and level translators, multistage op-amps, frequency response and stability, frequency and phase compensation techniques.

12 Hrs

UNIT - II

**Op-Amp Applications:** Inverting, non-inverting, differential and bridge amplifiers, summer, integrator, differentiator, V to I and I to V converters, op-amp feedback limiters using diodes, zener diodes, log and anti log amplifiers, analog multipliers, dividers, sample and hold circuits, peak detectors, precision rectifiers, instrumentation amplifier, mono-stable and astable multivibrators, comparators-Schmitt trigger using op-amp

12 Hrs

UNIT - III

**Data Converters & data Acquisition Systems:** D/A Converters - basic D/A converter, weighted binary type, ladder R-2R D/A converters, performance parameters and source of errors. A/D Converters - basic V/F converters, V/T converter, single slope and dual slope converter, A/D converter using D/A converter, counter ramp, continuous counter ramp, successive approximation, flash converter.

8Hrs

UNIT - IV

**Timers:** Basic timer circuit, 555 timer used as astable and monostable multivibrator, shmitt trigger, VCO.

**Active Filters:** First and second order Butterworth filters and its response (LP, HP, BP, BE, narrow band, all pass filters).
Communication Applications: PLL, brief study of PLL application of PLL for AM, FM detection, FSK decoder, frequency synthesis using commercial PLLs (565 and 566).

UNIT - V

Voltage Regulators: Analysis and design of series and shunt regulators using DC amplifiers, some commercial voltage regulators (MC 78 XX series, 723), high current negative voltage with fold back limiting concepts, switching regulators- basic concepts and applications.

TEXT BOOK:

REFERENCE BOOKS:
ELECTRONIC MEASUREMENTS AND TRANSDUCERS

Subject Code : 13EC403  Credits : 04
Hrs/Week : 4+0+0+2  Total Hours : 52

UNIT - I
Introduction to Electronic Instrumentation and Measurements:
Factors in making measurements, errors in measurement, bridge circuit’s, comparison measurements, basics of digital instruments  
10 Hrs

UNIT - II
DC & AC Measurement: DC Measurements, DC voltmeter, Ammeter, ohmmeter,
Digital type voltmeter, Ammeter, ohmmeter, AC measurement, Ammeter, ohmmeter,
AC voltmeter using rectifier.
True RMS voltmeter and Digital VOM meter. (Self Study /Case Study)  
6 Hrs

UNIT - III
TRANSDUCERS: Principles and classification of transducers, guidelines for selection and application of transducers, basic requirements of transducers. Different types of transducers, displacement, strain gauge, LVDT, potentiometer, capacitive & inductive.
Piezoelectric, temperature, optical and Hall effect transducers. (Self Study /Case Study)  
9 Hrs

UNIT - IV
Display Devices and Recorders: CRO (basic block diagram, deflection sensitivity, application: voltage, current, frequency and phase angle measurement).
Telemetry &Remote sensing, GIS (Geographical information System), various display devices & Recorder. (Self Study /Case Study)  
8 Hrs
UNIT - V
Frequency synthesizer – Principles & applications of Digital storage Oscilloscope – Logic analyzer (basics) (Self Study /Case Study) 6 Hrs

TEXT BOOKS:

REFERENCE BOOK:
ELECTROMAGNETIC THEORY

Subject Code : 13EC404  
Credits : 04
Hrs/Week : 4  
Total Hours : 52

UNIT - I

Coulomb’s Law and electric field Intensity: Experimental Law of Coulomb, Electric field intensity, Field due to continuous volume charge distribution, Field of a line charge

Electric flux density, Gauss’ law and divergence: Electric flux density, Gauss’ law’ Divergence’ Maxwell’s first equation (Electrostatics), vector operator V and divergence theorem

Energy and Potential: Energy expended in moving a point charge in an electric field, The line integral, Definition of potential difference and potential, The potential field of a point charge and system of charges, potential gradient, Energy density in an electrostatic field.  

11 Hrs

UNIT - II

Conductors, dielectrics and capacitance: Current and current density, Continuity of current, metallic conductors, Conductor properties and boundary conditions, boundary conditions for perfect Dielectrics, capacitance and examples.  

8 Hrs

UNIT - III

Poisson’s and Laplace’s equations: Derivations of Poisson’s and Laplace’s Equations, Uniqueness theorem, Examples of the solutions of Laplace’s and Poisson’s equations.

The steady magnetic field: Biot-Savart law, Ampere’s circuital law, Curl, Stokes’ theorem, magnetic flux and flux density, scalar and vector magnetic potentials  

10 Hrs

UNIT - IV

Magnetic forces: Forces on a moving charge and differential current element, Force between differential current elements, Force and torque on a closed circuit.

Magnetic materials and inductance : Magnetization and permeability, Magnetic boundary conditions, Magnetic circuit, Potential energy and forces on magnetic materials, Inductance and mutual Inductance.  

11 Hrs
UNIT - V

Time varying fields and Maxwell’s equations: Faraday’s law, displacement current, Maxwell’s equation in point and integral form, retarded potentials.

Uniform plane wave: Wave propagation in free space and dielectrics, Poynting’s theorem and wave power, propagation in good conductors – (skin effect). 12 Hrs

TEXT BOOK:

REFERENCE BOOKS:
ANALOG COMMUNICATION

Subject Code : 13EC405
Credits : 04
Hrs/Week : 4
Total Hours : 52

UNIT - I

Amplitude Modulation: Introduction, Time Domain and Frequency domain description, Generation and Detection of AM, Various types of AM, Generation and Detection of different types of AM (SSB, DSB-SC, VSB) Applications of AM. 12 Hrs

UNIT - II

Angle Modulation: Basic Definitions, frequency modulation, narrow band and wide band frequency modulation, Transmission bandwidth of FM, Generation and detection of FM, FM stereo multiplexing, PLL, Nonlinear effects of FM, applications. 12 Hrs

UNIT - III

Random Process: Introduction, probability theory, conditional probability, random variables, statistical averages, Random process: stationarity, mean, correlation and covariance functions, power spectral density, Gaussian process. 10 Hrs

UNIT - IV

Noise: Introduction, Shot noise, Thermal noise, White noise, Noise equivalent bandwidth, Narrow band noise, Noise figure, Equivalent noise temperature, Signal to noise Ratio, Cascade connection of two port networks Noise factor. 8 Hrs

UNIT - V

Noise in Continuous Wave Modulation Systems: Introduction, receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Noise in FM receivers, Threshold Effect, pre-emphasis and de-emphasis in FM. 10 Hrs
TEXT BOOK:

REFERENCE BOOK:
DIGITAL SYSTEM DESIGN USING VHDL

Subject Code : 13EC406  Credits : 04
Hrs/Week : 4  Total Hours : 52

UNIT - I

Introduction: About VHDL.
Code Structure: Fundamental VHDL Units, LIBRARY Declarations
ENTITY, ARCHITECTURE.
Data Types: Pre-Defined Data Types, User-Defined Data Types,
Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data
Types, Data Conversion, Summary.  10 Hrs

UNIT - II

Operators and Attributes: Operators, Attributes, User-Defined
Attributes, Operator Overloading, GENERIC.
Concurrent Code: Concurrent versus Sequential, Using Operators,
WHEN (Simple and Selected), GENERATE.  10 Hrs

UNIT - III

Sequential Code: PROCESS, Signals and Variables, IF, WAIT,
CASE, LOOP, CASE versus IF, CASE versus WHEN, Using
Sequential Code to Design Combinational Circuits.
Signals and Variables: CONSTANT, SIGNAL, VARIABLE,
SIGNAL versus VARIABLE.  10 Hrs

UNIT - IV

State Machines: Introduction, finite state machine design.
Packages and Components: Introduction, PACKAGE,
COMPONENT, PORT MAP, GENERIC MAP.
Functions and Procedures: FUNCTION, Function Location,
PROCEDURE, Procedure Location, FUNCTION versus
PROCEDURE.  12 Hrs

UNIT - V

Introduction to Verilog: Brief comparison of VHDL and Verilog,
constructs used in Verilog Dataflow, switch level, behavioral styles in
Verilog, Programming examples for the switch level, behavioral and
dataflow styles.  10 Hrs
TEXT BOOKS:
T1. Volnei A. Pedroni, “Circuit Design with VHDL”, PHI.
T2. Nazieh M.Botros, “HDL Programming(VHDL and Verilog)”, John Wiley India Pvt.Ltd.2008

REFERENCE BOOKS:
LINEAR INTEGRATED CIRCUITS & APPLICATIONS LAB

Subject Code: 13EC407  
Credits: 02  
Hrs/Week: 3

List of Experiments

   Op – amp as an  
   a) Inverting Amplifier.  
   b) Non – inverting amplifier.  
   c) Integrator.  
   d) Non inverting Integrator  
   e) Differentiator

2. Design and testing for the performance of  
   a) Zero crossing detector, ZCD as part of wave shapers  
   b) Summer/ Adder (Inverting & Non inverting).

3. Design and testing Schmitt trigger for different hysteresis values using Op-amps.


6. Design and testing of  
   a) R -2R N/W DAC using Op – amps  
   b) Flash type ADC using Op – amps

7. Design and testing of IC 723 voltage regulator (high / low voltages).

8. Design and testing of IC 78XX voltage regulators

9. Timer IC 555 experiments: Monostable multivibrator, Astable multivibrator, Schmitt trigger, VCO

10. Butterworth Filter (2\textsuperscript{nd} order): LPF, HPF and All pass filter.
DIGITAL SYSTEM DESIGN LAB

Subject Code : 13EC408
Hrs/Week : 3

Credits: 02

List of Experiments

CODING

1. Write a VHDL code to realize all logic gates.
2. Write a VHDL program for combinational designs
3. Develop the VHDL code for flip-flops,
4. Design & testing of binary & BCD counters (Synchronous reset and Asynchronous reset) and “any sequence” counters.

INTERFACING

5. Write VHDL code to display messages on the given seven segment display and accepting
6. Write VHDL code to control speed, direction of DC and Stepper motor.
7. Write VHDL code to generate different waveforms using DAC
8. Write VHDL code to control external lights using relays.