B.Tech (ETC/ECE) detail Syllabus for Admission Batch 2015-16

### First Semester

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<th>Credit</th>
<th>University Marks</th>
<th>Internal Evaluation</th>
<th>Hours/Week L/T</th>
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4 Year B.Tech (Electronics & Telecommunication Engg.) Program Structure for admission batch of 2015-16
B.Tech (ETC/ECE) detail Syllabus for Admission Batch 2015-16

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**Second Year Engineering**

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<th>Marks</th>
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**Fourth Semester**

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<th>Credit Practical</th>
<th>Marks</th>
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<td>100</td>
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- *College should conduct at least one NSDC program under this category.

4 Year B.Tech (Electronics & Telecommunication Engg.) Program Structure for admission batch of 2015-16
### Third Year Engineering

#### Fifth Semester

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<td>Control Systems</td>
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<td>Fiber Optics &amp; Optoelectronics Devices/Computer</td>
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<td>Organization /Power Electronics/Electromagnetic Interference &amp; Compatibility/Electronic Devices &amp; Modelling/Sensors &amp; Transducers/Object Oriented Programming/Advanced Analog Electronic Circuits</td>
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<td>OE</td>
<td>JAVA Programming/Digital VLSI Design/Digital System design/Brain Computer Interfacing/Optimization in Engg</td>
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Total Marks: 1100

Total Credits: 24

For Honours and Minor Specialization

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<td>Information Theory &amp; Coding/Computer Network &amp; Data Communication/Mobile Communication/Biomedical Electronics/Industrial Electronics/Robotics &amp; computer Vision/Pattern Analysis &amp; Machine Intelligence/Analog VLSI Design</td>
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# To be conducted by the Training & Placement department by inviting experts from the industry. No academician to be called. Record may be asked by the University for verification. Evaluation to be done by the TPO.

### 4 Year B.Tech (Electronics & Telecommunication Engg.) Program Structure for admission batch of 2015-16
## Final Year Engineering

### Seventh Semester

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| OE   | Soft Computing */ Other subjects                                                               | 3-1            | 4             | 100          | 50                |                |           |       |

| PC   | Advance Lab-II/ Project                                                                         | 8              | 4             | 200          |                   |                |           |       |

| PC   | Projects on Internet of Things                                                                 | 8              | 4             | 200          |                   |                |           |       |

**Total**

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For Honours and Minor Specialization

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*Student can choose from any department but subject must be running in that semester.

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4 Year B.Tech (Electronics & Telecommunication Engg.) Program Structure for admission batch of 2015-16
B.Tech (ETC/ECE) detail Syllabus for Admission Batch 2015-16

Eighth Semester

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Note- Minimum Pass Mark from Industry Evaluation is 300 (i.e. 60%).

Distribution of Credit Semester wise:
Semester | Credit
---|---
First | 25
Second | 25
Third | 23
Fourth | 25
Fifth | 24
Sixth | 24
Seventh | 24
Eighth | 20
---|---
Total | 190

Internal Evaluation Scheme

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<th>Attendance &amp; Class Interaction</th>
<th>05</th>
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<tbody>
<tr>
<td>Assignment</td>
<td>05</td>
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<tr>
<td>Surprise Test</td>
<td>05</td>
</tr>
<tr>
<td>Quiz</td>
<td>05</td>
</tr>
<tr>
<td>Class Test I &amp; II</td>
<td>30</td>
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<td>Total</td>
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</table>

Class Test Time(Hrs.): 1

4 Year B.Tech (Electronics & Telecommunication Engg.) Program Structure for admission batch of 2015-16
Pass Mark in Internal is 50% of total marks i.e. 25

**External Evaluation Scheme**

University Semester Examination of 3 Hours duration.
Pass mark will be 35% which means students have to score 35 out of 100.

**Practical/Sessional Evaluation Scheme**

Pass mark will be 50% which means students have to score 25 out of 50.

**Evaluation Scheme**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Attendance &amp; Daily Performance</td>
<td>-10</td>
</tr>
<tr>
<td>Lab Record</td>
<td>-10</td>
</tr>
<tr>
<td>Lab Quiz</td>
<td>-05</td>
</tr>
<tr>
<td>Final Experiments &amp; Viva</td>
<td>-25</td>
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Total=50

All Lab examinations are to be completed one week before the end semester examination and marks are to be displayed on the college notice board.
DETAIL SYLLABUS
FROM
III - VIII SEMESTER OF B.TECH. DEGREE PROGRAMME

for
ADMISSION BATCH 2015-16

BRANCH-ETC/ECE
### Second Year Engineering
#### Third Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>Hours/week</th>
<th>Credit Theory</th>
<th>University Marks</th>
<th>Internal Evaluation</th>
<th>Hours/Week</th>
<th>Credit Prac</th>
<th>Marks</th>
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<tbody>
<tr>
<td>PC</td>
<td>Analog Electronics Circuits</td>
<td>3-0</td>
<td>3</td>
<td>100</td>
<td>50</td>
<td>2</td>
<td>1</td>
<td>50</td>
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<td>PC</td>
<td>Network Theory</td>
<td>3-0</td>
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<td>100</td>
<td>50</td>
<td>2</td>
<td>1</td>
<td>50</td>
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<tr>
<td>PC</td>
<td>Signal &amp; Systems</td>
<td>3-0</td>
<td>3</td>
<td>100</td>
<td>50</td>
<td>2</td>
<td>1</td>
<td>50</td>
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<td>1</td>
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<td>50</td>
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<tr>
<td>HS</td>
<td>Engineering Economics/ Organizational Behavior</td>
<td>2-1</td>
<td>3</td>
<td>100</td>
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<tr>
<td>HS</td>
<td>Probability and random process</td>
<td>4</td>
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<td>50</td>
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<tr>
<td>Minor Specialization</td>
<td>Analog electronics circuit</td>
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</table>

### Fourth Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>Hours/week</th>
<th>Credit Theory</th>
<th>University Marks</th>
<th>Internal Evaluation</th>
<th>Hours/Week</th>
<th>Credit Prac</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>HS</td>
<td>Purely Applied Mathematics for Specific Branch of Engineering</td>
<td>3-0</td>
<td>3</td>
<td>100</td>
<td>50</td>
<td>2</td>
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<tr>
<td>PC</td>
<td>Electromagnetics Engg.</td>
<td>3-0</td>
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<td>100</td>
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<td>2</td>
<td>1</td>
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</tr>
<tr>
<td>PC</td>
<td>Electrical Machines &amp; Power Devices</td>
<td>3-0</td>
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<td>100</td>
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<td>2</td>
<td>1</td>
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<tr>
<td>PC</td>
<td>Electrical &amp; Electronics Measurements</td>
<td>3-0</td>
<td>3</td>
<td>100</td>
<td>50</td>
<td>2</td>
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<tr>
<td>PC</td>
<td>Microprocessors &amp; Microcontrollers</td>
<td>3-0</td>
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<td>2</td>
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<tr>
<td>HS</td>
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<td>3</td>
<td>100</td>
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<td>*Skill Project and Hands on</td>
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<td>6</td>
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<tr>
<td>HS</td>
<td>Audio &amp; Video Engineering</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td></td>
<td>1</td>
<td>50</td>
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<tr>
<td>Minor Specialization</td>
<td>Any one course to be taken from the following: Microprocessors and Microcontrollers / Electrical and Electronics Measurements</td>
<td></td>
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</tr>
</tbody>
</table>

*College should conduct at least one NSDC program under this category.*
ANALOG ELECTRONICS CIRCUIT (3-0-2)

MODULE – I (12 Hours)

MOS Field-Effect Transistor: Principle and Operation of FETs and MOSFETs; P-Channel and N-Channel MOSFET; Complimentary MOS; V-I Characteristics of E- MOSFET and D-MOSFET; MOSFET as an Amplifier and as a Switch. (4 Hours)

Biasing of BJTs: Load lines (AC and DC); Operating Points; Fixed Bias and Self Bias, DC Bias with Voltage Feedback; Bias Stabilization; Examples. (4 Hours)

Biasing of FETs and MOSFETs: Fixed Bias Configuration and Self Bias Configuration, Voltage Divider Bias and Design (4 Hours)

MODULE – II (12 Hours)

Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Models; Small Signal Analysis of CE, CC, CB amplifiers. Effects of Rs and RL on CE amplifier operation, Emitter Follower; Cascade amplifier, Darlington Connection and Current Mirror Circuits. (6 Hours)

Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers. Effects of Rsig and Rl on CS Amplifier; Source Follower and Cascaded System. (6 Hours)

MODULE – III (5 hours)

High Frequency Response of FETs and BJTs: High Frequency equivalent models and frequency Response of BJTs and FETs; Frequency Response of CS Amplifier, Frequency Response of CE Amplifier. (5 Hours)

MODULE – IV (9 hours)

Feedback amplifier and Oscillators: Concepts of negative and positive feedback; Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits. (4 Hours)


Additional Module (Terminal Examination-Internal) (6 hours)

Basic analysis of difference amplifier, Simulation of analog circuits i.e., different single and cascaded amplifier circuits, difference amplifier circuits and validating the theoretical parameters using PSpice and MULTISIM. Analysis op-amp IC circuits using LF411 and µA 741, Signal Generators using OPAMP: Square, triangle and ramp generator circuits using opamps - Effect of slew rate on waveform generation-introduction to analog simulation OPAMP as nonlinear element: comparator, Voltage controlled oscillator (VCO). Concept of Schmitt triggers circuit and sample/hold circuit using operational amplifier

Text Books

1. Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, Pearson Education, New Delhi, 9th/10th Edition, 2013. (Selected portions of Chapter 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14)

3rd Semester

Reference Books
7. Electronics devices and circuits, Anil K. Maini, Wiley India Pvt. Ltd, 2009

ANALOG ELECTRONICS CIRCUIT LAB
List of Experiments
(At least 10 out of 12 experiments should be done)

1. Design and simulate BJT bias circuit and compare the results.
2. Design and simulate JFET/MOSFET bias circuit and compare the results.
3. Design and simulate BJT common-emitter circuit and compare D.C and A.C performance:
4. Design and simulate JFET/MOSFET common-emitter circuit and compare D.C and A.C performance:
5. Determining the frequency response of a common-emitter amplifier: low frequency, high frequency and mid frequency response and compare with simulated results.
7. Study of Darlington connection and current mirror circuits.
8. OP-Amp Frequency Response and Compensation.
10. Obtain the band width of FET/ BJT using Square wave testing of an amplifier.
NETWORK THEORY(3-0-2)

MODULE- I (10 Hrs)

Network Topology: Graph of a network; Concept of tree; Incidence matrix; Tie-set matrix; Cut-set matrix; Formulation and solution of network equilibrium equations on loop and node basis.

Network Theorems & Coupled Circuits: Substitution theorem; Reciprocity theorem; Maximum power transfer theorem; Tellegen's theorem; Millman's theorem; Compensation theorem; Coupled Circuits; Dot Convention for representing coupled circuits; Coefficient of coupling.

MODULE- II (08 Hrs)

Laplace Transform & Its Application: Introduction to Laplace Transform, Laplace transform of some basic functions, Laplace transform of periodic functions, Inverse Laplace transform, Application of Laplace transform: Circuit Analysis (Steady State and Transient).

MODULE- III (08 Hrs)

Two Port Network Functions & Responses: z, y, ABCD and h-parameters; Reciprocity and Symmetry; Interrelation of two-port parameters, Interconnection of two-port networks; Network Functions; Significance of Poles and Zeros, Restriction on location of Poles and Zeros, Time domain behaviour from Pole-Zero plots.

MODULE- IV (08 Hrs)

Fourier Series and Fourier Transform: Fourier series, Fourier analysis and evaluation of coefficients; Steady state response of network to periodic signals; Fourier transform and convergence; Fourier transform of some functions; Brief idea about network filters (Low pass, High pass, Band pass and Band elimination) and their frequency response.

Additional Module (Terminal Examination-Internal) (08 hours)

Network Synthesis: On network synthesis.

Text Book(s)

Reference Book(s)
NETWORK THEORY LAB
(At least 8 out of 10 experiments should be done)

1. Verification of Network Theorems (Superposition, Thevenin, Norton, Maximum Power Transfer).
2. Study of DC and AC Transients.
3. Determination of circuit parameters: Open Circuit and Short Circuit parameters.
5. Frequency response of Low pass and High Pass Filters.
6. Frequency response of Band pass and Band Elimination Filters.
7. Determination of self inductance, mutual inductance and coupling coefficient of a single phase two winding transformer representing a coupled circuit.
8. Study of resonance in R-L-C series circuit.
10. Spectral analysis of a non-sinusoidal waveform.

SIGNALS & SYSTEMS (3-0-2)

MODULE – I (10 Hours)
Discrete-Time Signals and Systems:

MODULE – II (10 Hours)
The Continuous-Time Fourier Series:
Basic Concepts and Development of the Fourier series; Calculation of the Fourier Series, Properties of the Fourier Series.
The Continuous-Time Fourier Transform:
Basic Concepts and Development of the Fourier Transform; Properties of the Continuous-Time Fourier Transform.

MODULE – III (10 Hours)
The Z-Transform and Its Application to the Analysis of LTI Systems:
MODULE- IV  (6 Hours)

The Discrete Fourier Transform: Its Properties and Applications:

Additional Module (Terminal Examination-Internal) (04 Hours)

Properties of Continuous-Time Systems:
Block Diagram and System Terminology; System Properties: Homogeneity, Time Invariance, Additivity, Linearity and Superposition, Stability, Causality.

Text Books
2. Fundamentals of Signals and Systems - M. J. Roberts, TMH

Reference Books
1. Signals and Systems - P. Ramakrishna. Rao, TMH.
2. Signals and Systems – A NagoorKani, TMH
3. Signals and Systems, Chi-Tsong Chen, Oxford
5. Principles of Linear Systems and Signals, B.P Lathi, Oxford
**3rd Semester**

**SIGNALS AND SYSTEMS LAB**

List of Experiments:
(At least 10 out of 15 experiments should be done)

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.
2. Find the Fourier transform of a square pulse. Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential Fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal \( x(t) \) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal.

\[
x(t) = \begin{cases} 
\cos(2\pi \times 47t) + \cos(2\pi \times 219t), & 0 \leq t \leq 10 \\
0 & \text{otherwise}
\end{cases}
\]

8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.
11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence. Compute the mean and variance of the random signal by a suitable method.
13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of \( N=1000 \) i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.
DIGITAL ELECTRONICS (3-0-2)

University Level:

MODULE – I (12 Hours)

Number System: Introduction to various number systems and their Conversion. Arithmetic Operation using 1’s and 2’s Compliments, Signed Binary and Floating Point Number Representation. Introduction to Binary codes and their applications. (5 Hours)

Boolean Algebra and Logic Gates: Boolean algebra and identities, Complete Logic set, logic gates and truth tables. Universal logic gates, Algebraic Reduction and realization using logic gates (3 Hours)

Combinational Logic Design: Specifying the Problem, Canonical Logic Forms, Extracting Canonical Forms, EX-OR Equivalence Operations, Logic Array, K-Maps: Two, Three and Four variable K-maps, NAND and NOR Logic Implementations. (4 Hours)

MODULE – II (14 Hours)

Logic Components: Concept of Digital Components, Binary Adders, Subtraction and Multiplication, An Equality Detector and comparator, Line Decoder, encoders, Multiplexers and De-multiplexers. (5 Hours)

Synchronous Sequential logic Design: sequential circuits, storage elements: Latches (SR, D), Storage elements: Flip-Flops inclusion of Master-Slave, characteristics equation and state diagram of each FFs and Conversion of Flip-Flops. Analysis of Clocked Sequential circuits and Mealy and Moore Models of Finite State Machines (6 Hours)

Binary Counters: Introduction, Principle and design of synchronous and asynchronous counters, Design of MOD-N counters, Ring counters. Decade counters, State Diagram of binary counters (4 hour)

MODULE – III (12 hours)

Shift resistors: Principle of 4-bit shift resistors. Shifting principle, Timing Diagram, SISO, SIPO, SISO and PISO resistors. (4 hour)

Memory and Programmable Logic: Types of Memories, Memory Decoding, error detection and correction), RAM and ROMs. Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices. (5 Hours)

IC Logic Families: Properties DTL, RTL, TTL, I^2L and CMOS and its gate level implementation. A/D converters and D/A converters (4 Hours)

College Level (20%)

Basic hardware description language: Introduction to Verilog/VHDL programming language, Verilog/VHDL program of logic gates, adders, Subtractors, Multiplexers, Comparators, Decoders flip-flops, counters, Shift resistors.

Text book:
2. Fundamentals of digital circuits, 8th edition, A. Anand Kumar, PHI
3rd Semester

Reference Book:


DIGITAL ELECTRONICS LAB

List of Experiments:
(At least 10 experiments should be done, Experiment No. 1 and 2 are compulsory and out of the balance 8 experiments at least 3 experiments has to be implemented through both Verilog/VHDL and hardware implementation as per choice of the student totaling to 6 and the rest 2 can be either through Verilog/VHDL or hardware implementation.)

1. Digital Logic Gates: Investigate logic behavior of AND, OR, NAND, NOR, EX-OR, EX-NOR, Invert and Buffer gates, use of Universal NANDGate.
2. Gate-level minimization: Two level and multi level implementation of Boolean functions.
3. Combinational Circuits: design, assemble and test: adders and subtractors, code converters, gray code to binary and 7 segment display.
4. Design, implement and test a given design example with (i) NAND Gates only (ii) NOR Gates only and (iii) using minimum number of Gates.
5. Design with multiplexers and de-multiplexers.
7. Shift Registers: Design and investigate the operation of all types of shift registers with parallel load.
9. Memory Unit: Investigate the behaviour of RAM unit and its storage capacity – 16 X 4 RAM: testing, simulating and memory expansion.
12. Binary Multiplier: design and implement a circuit that multiplies 4-bit unsigned numbers to produce an 8-bit product.
13. Verilog/VHDL simulation and implementation of Experiments listed at Sl. No. 3 to 12
SEMICONDUCTOR DEVICES (3-1-0)

MODULE-I (10 Hours)
Introduction to the quantum theory of solids: Formation of energy bands; the k-space diagram (two and three dimensional representation), conductors, semiconductors and insulators.

Electrons and Holes in semiconductors: Silicon crystal structure; Donors and acceptors in the band model; electron effective mass; Density of states; Thermal equilibrium; and Fermi-Dirac distribution function for electrons and holes; Fermi energy. Equilibrium distribution of electrons & holes: derivation of $n$ and $p$ from $D(E)$ and $f(E)$, Fermi level and carrier concentrations; The $np$ product and the intrinsic carrier concentration. General theory of $n$ and $p$; Carrier concentrations at extremely high and low temperatures: complete ionization, partial ionization and freeze-out; Energy-band diagram and Fermi-level, Variation of $E_F$ with doping concentration and temperature.

MODULE-II (10 Hours)
Motion and Recombination of Electrons and Holes: Carrier drift: Electron and hole mobilities; Mechanism of carrier scattering; Drift current and conductivity.

Motion and Recombination of Electrons and Holes (continued): Carrier diffusion: diffusion current, Total current density; relation between the energy diagram and potential, electric field; Einstein relationship between diffusion coefficient and mobility; Electron-hole recombination; Thermal generation.

PN Junction: Building blocks of the pn junction theory: Energy band diagram and depletion layer of a pn junction, Built-in potential; Depletion layer model: Field and potential in the depletion layer, depletion-layer width; Reverse-biased PN junction; Capacitance-voltage characteristics; Junction breakdown: peak electric field. Tunneling breakdown and avalanche breakdown; Carrier injection under forward bias-Quasi-equilibrium boundary condition; current continuity equation; Excess carriers in forward-biased pn junction; PN diode I-V characteristic, Charge storage.

MODULE-III (10 Hours)
The Bipolar Transistor: Introduction, Modes of operation; Minority Carrier distribution, Collector current, Base current, current gain, Base width Modulation by collector current, Breakdown mechanism, Equivalent Circuit Models – Ebers -Moll Model.

MODULE-IV (12 Hours)
Metal-Semiconductor Junction: Schottky Diodes: Built-in potential, Energy-band diagram, I-V characteristics, Comparison of the Schottky barrier diode and the pn-junction diode; Ohmic contacts: tunneling barrier, specific contact resistance.

MOS Capacitor: The MOS structure, Energy band diagrams, Flat-band condition and flat-band voltage, Surface accumulation, surface depletion, Threshold condition and threshold voltage, MOS C-V characteristics, $Q_{inv}$ in MOSFET.
3rd Semester

Additional Module (Terminal Examination-Internal) (06 Hours)

MOS Transistor: Introduction to the MOSFET, Complementary MOS (CMOS) technology, V-I Characteristics; Surface mobilities and high-mobility FETs, JFET, MOSFET Vt; Body effect and steep retrograde doping, pinch-off voltage,

Text Books


Reference Books

4. Semiconductor Physics and Devices- Fowler, Oxford University Press.
ENGINEERING ECONOMICS

*Theory L/T (Hours per week):2/1, Credit: 3*

Module I (12 hours)


Demand- Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved ), Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium (Simple numerical problems to be solved).

Production-Production function, Laws of returns: Law of variable proportion, Law of returns to scale

Module II (12 hours)

Cost and revenue concepts, Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).

Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank.

Inflation-Meaning of inflation, types, causes, measures to control inflation.

National Income-Definition, Concepts of national income, Method of measuring national income.

Module III (12 hours)

Time value of money- Interest - Simple and compound, nominal and effective rate of interest, Cash flow diagrams, Principles of economic equivalence.


Depreciation- Depreciation of capital assert, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project.

Text Books

5. Ahuja,H.L., “Principles of Micro Economics”, S.Chand & Company Ltd
7. Macro Economics by S.P.Gupta, TMH
### ORGANIZATIONAL BEHAVIOUR

**Credit- 3**  
**Class Hours - 40**

**Objectives:**

1. To develop an understanding of the behavior of individuals and groups inside organizations
2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations.
3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Contents</th>
<th>Class Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td><strong>Fundamentals of OB:</strong> Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB.</td>
<td>6</td>
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</tbody>
</table>
| 02   | **Attitude:** Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes.  
**Personality and values:** Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications.  
**Perception:** Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect).  
**Motivation:** Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation. | 10          |
03 **Foundations of Group Behavior:** The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development.

**Managing Teams:** Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building.

**Leadership:** Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

04 **Organizational Culture:** Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality.

05 **Organizational Change:** Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change.


**Reference Books**
1. *Understanding Organizational Behaviour*, Parek, Oxford
3. *Organizational Behaviour*, K. Awathappa, HPH.
4. *Organizational Behaviour*, VSP Rao, Excel
5. *Introduction to Organizational Behaviour*, Moorhead, Griffin, Cengage.
6. *Organizational Behaviour*, Hitt, Miller, Colella, Wiley
HONOURS SUBJECT
PROBABILITY AND RANDOM PROCESSES(4-0-0)

MODULE-I (06 Hours)

MODULE-II (08 Hours)

MODULE-III (08 Hours)

MODULE-IV (10 Hours)

Additional Module (Terminal Examination-Internal) (10 Hours)

Text Books

Reference Books
3rd Semester

ANALOG ELECTRONICS CIRCUIT (3-0-2)(Minor Subject)

MODULE – I (12 Hours)
MOS Field-Effect Transistor: Principle and Operation of FETs and MOSFETs; P-Channel and N-Channel MOSFET; Complimentary MOS; V-I Characteristics of E- MOSFET and D-MOSFET; MOSFET as an Amplifier and as a Switch. (4 Hours)
Biasing of BJTs: Load lines (AC and DC); Operating Points; Fixed Bias and Self Bias, DC Bias with Voltage Feedback; Bias Stabilization; Examples. (4 Hours)
Biasing of FETs and MOSFETs: Fixed Bias Configuration and Self Bias Configuration, Voltage Divider Bias and Design. (4 Hours)

MODULE – II (12 Hours)
Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Models; Small Signal Analysis of CE, CC, CB amplifiers. Effects of $R_S$ and $R_L$ on CE amplifier operation, Emitter Follower; Cascade amplifier, Darlington Connection and Current Mirror Circuits. (6 Hours)
Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers. Effects of $R_{SIG}$ and $R_L$ on CS Amplifier; Source Follower and Cascaded System. (6 Hours)

MODULE – III (5 Hours)
High Frequency Response of FETs and BJTs: High Frequency equivalent models and frequency Response of BJTs and FETs; Frequency Response of CS Amplifier, Frequency Response of CE Amplifier. (5 Hours)

MODULE – IV (9 hours)
Feedback amplifier and Oscillators: Concepts of negative and positive feedback; Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits. (4 Hours)

Additional Module (Terminal Examination-Internal) (6 hours)
Basic analysis of difference amplifier, Simulation of analog circuits i.e., different single and cascaded amplifier circuits, difference amplifier circuits and validating the theoretical parameters using PSpice and MULTISIM. Analysis op-amp IC circuits using LF411 and µA 741, Signal Generators using OPAMP: Square, triangle and ramp generator circuits using opamps - Effect of slew rate on waveform generation-introduction to analog simulation OPAMP as nonlinear element: comparator, Voltage controlled oscillator (VCO). Concept of Schmitt triggers circuit and sample/hold circuit using operational amplifier.
B.Tech(ETC/ECE) Syllabus for Admission batch 2015-16

3rd Semester

Text Books
1. Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, Pearson Education, New Delhi, 9th/10th Edition, 2013. (Selected portions of Chapter 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14)

Reference Books
ELECTROMAGNETICS ENGINEERING

(3-0-2)

Module-I (10 Hours)

1. Cartesian, Cylindrical and Spherical Coordinate Systems; Scalar and Vector Fields; Line, Surface and Volume Integrals.
2. Coulomb’s Law; The Electric Field Intensity; Electric Flux Density and Electric Flux; Gauss’s Law; Divergence of Electric Flux Density: Point Form of Gauss’s Law; The Divergence Theorem; The Potential Gradient; Energy Density; Poisson’s and Laplace’s Equations.
3. Ampere’s Magnetic Circuital Law and its Applications; Curl of \( \mathbf{H} \); Stokes’ Theorem; Divergence of \( \mathbf{B} \); Energy Stored in the Magnetic Field.

Module-II (8 Hours)

1. The Continuity Equation; Faraday’s Law of Electromagnetic Induction; Conduction Current; Point Form of Ohm’s Law, Convection Current; The Displacement Current;
2. Maxwell’s Equations in Differential Form; Maxwell’s Equations in Integral Form; Maxwell’s Equations for Sinusoidal Variation of Fields with Time; Boundary Conditions; The Retarded Potential; The Poynting Vector; Poynting Vector for Fields Varying Sinusoidally with Time.

Module-III (8 Hours)

1. Solution of the One-Dimensional Wave Equation; Solution of Wave Equation for Sinusoidally Time-Varying Fields; Polarization of Uniform Plane Waves; Fields on the Surface of a Perfect Conductor; Reflection of a Uniform Plane Wave Incident Normally on a Perfect Conductor and at the Interface of Two Dielectric Regions; The Standing Wave Ratio; Oblique Incidence of a Plane Wave at the Boundary between Two Regions; Oblique Incidence of a Plane Wave on a Flat Perfect Conductor and at the Boundary between Two Perfect Dielectric Regions;

Module-IV (8 Hours)

1. Types of Two-Conductor Transmission Lines; Circuit Model of a Uniform Two-Conductor Transmission Line; The Uniform Ideal Transmission Line; Wave Reflection at a Discontinuity in an Ideal Transmission Line; Matching of Transmission Lines with Load.

Additional Module (Terminal Examination-Internal) (8 Hours)

1. Formulation of Field Equations; Wave Types; the Parallel-Plate Waveguide; the Rectangular Waveguide.
2. Radiation Properties of a Current Element; Radiation Properties of a Half-Wave Dipole; Yagi-Uda Antenna; the Parabolic Reflector Antenna.
3. The Vector Magnetic Potential; Energy stored in a capacitor, Graphical field mapping; Continuity of Current in a Capacitor; Critical Angle of Incidence and Total Reflection; Brewster Angle.
Text Books


Reference Books

ELECTRICAL MACHINES AND POWER DEVICES

Module- I(10 Hours)

1. **GENERAL PRINCIPLES OF DC MACHINES:** Constructional Features; Methods of Excitation; Expression for EMF Induced and Torque Developed in the Armature.

2. **DC GENERATORS:** No Load Characteristics for Separately Excited DC Generator and DC Shunt Generator, Conditions for Self Excitation; Critical Resistance and Critical Speed; Losses and Efficiency.

Module-II(8 Hours)

3. **DC MOTORS:** Speed Armature Current, Torque Armature Current and Speed Torque Characteristic for (i) Separately Excited DC Motor, (ii) DC Shunt Motor, (iii) DC Series Motor, and (iv) DC Compound Motor, Speed control and Starting of DC shunt and DC series motors, Brushless motors; Motor drive circuits.

Module-III (10 Hours)

4. **TRANSFORMERS:** Constructional Features; EMF Equation; Turns Ratio, Determination of Parameters From Tests (Open Circuit Test and Short Circuit Test), Equivalent Circuit, Losses and Efficiency; Introduction to Three Phase Transformers: Three Single Phase Transformers Connected as a Bank of Three Phase Transformer.

5. **THREE PHASE SYNCHRONOUS MACHINES:** Constructional Features; Principle of operation as Alternator and Synchronous Motor; Synchronous Impedance; Voltage Regulation by Synchronous Impedance Method; Power-Angle curve; Synchronization of Alternators; Torque Expression and Phasor Diagram for Synchronous Motor; Electrical Power and Mechanical Power; Starting of Synchronous Motor.

Module-IV (10 Hours)

6. **THREE PHASE INDUCTION MOTORS:** Constructional Features of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors, Principle of Operation; Concept of Slip, Slip Torque Characteristics; Starting of Squirrel Cage Rotor type and Slip Ring/Wound Rotor type of Induction Motors; Speed Control of Induction Motors.

7. **SINGLE PHASE INDUCTION MOTORS and COMMUTATOR MOTORS:** Revolving Field Theory; Split Phase (capacitor start and run) and Shaded Pole Starting of Single Phase Induction Motors; Speed Current, Torque Current and Speed Torque Characteristic for Single Phase AC Series Motor.

Additional Module (Terminal Examination-Internal) (6 Hours)

8. **POWER SEMICONDUCTOR DEVICES:** Switching and V-I characteristic of devices Thyristor family: SCR, DIAC, TRIAC, GTO; Different Triggering Methods of SCR.
4th semester

Text Book

Reference Books

ELECTRICAL AND ELECTRONICS MEASUREMENTS

Module-I (6 Hrs)
1. **Introduction**: (a) Measurement and Error: Definition, Accuracy and Precision; Significant Figures, Types of Errors. (b) Standards of Measurement: Classification of Standards, Electrical Standards, IEEE Standards.

Module-II (8 Hrs)

Module- III (10 Hrs)
4. **Ammeter and Voltmeter**: Derivation for Deflecting Torque of; PMMC, MI (attraction and repulsion types), Electro Dynamometer and Induction Type Ammeters and Voltmeters.
5. **Potentiometer**: Principle of operation of DC Potentiometers (Crompton, Vernier, Constant Resistance and Deflectional Potentiometer); AC Potentiometers (Drysdale-Tinsley and Gall-Tinsley Potentiometer).
Module- IV (12 Hrs)


7. **Current Transformer and Potential Transformer**: Construction, Theory, Characteristics and Testing of CTs and PTs.

8. **Electronic Instruments for Measuring Basic Parameters**: Amplified DC Meters, AC Voltmeters using Rectifiers, True RMS Voltmeter, Considerations for choosing an Analog Voltmeter, Digital Voltmeters (Block Diagrams only), Q-meter.

Additional Module (Terminal Examination- Internal) (8 Hrs.)


Text Book(s)


2. *Modern Electronic Instrumentation and Measurement Techniques, Albert D Helfrick & W. D Cooper, 2nd Edition Phi Learning (For sections 1, 7 to 9: Selected Portions from Ch.-1, 3, 6, 7, 9, 10, and 13).*


Reference Book(s)


MICROPROCESSORS AND MICROCONTROLLERS

Module-I (10 Hours)

1. Introduction to 8 bit and 16 bit Microprocessors-H/W architecture
   Introduction to microprocessor, computer and its organization, Programming system; Address bus, data bus and control bus, Tristate bus; clock generation; Connecting Microprocessor to I/O devices; Data transfer schemes; Architectural advancements of microprocessors. Introductory System design using microprocessors; 8086 – Hardware Architecture; External memory addressing; Bus cycles; some important Companion Chips; Maximum mode bus cycle; 8086 system configuration; Memory Interfacing; Minimum mode system configuration, Interrupt processing.

Module -II (11 Hours)

1. 16-bit microprocessor instruction set and assembly language programming:
   Programmer’s model of 8086; operand types, operand addressing; assembler directives, instruction Set-Data transfer group, Arithmetic group, Logical group.

Module-III (12 Hours)

2. Microprocessor peripheral interfacing:
   Introduction; Generation of I/O ports; Programmable Peripheral Interface (PPI)-Intel 8255; Sample-and-Hold Circuit and Multiplexer; Keyboard and Display Interface; Keyboard and Display Controller (8279).

Module-IV (11 Hours)

3. 8-bit microcontroller- H/W architecture instruction set and programming:
   Introduction to 8051 Micro-Controllers, Architecture; Memory Organization; Special Function register; Port Operation; Memory Interfacing, I/O Interfacing; Programming 8051 resources, interrupts; Programmer’s model of 8051; Operand types, Operand addressing; Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions; Programming.

Additional Module (Terminal Examination-Internal) (6 Hours)

5. 8086: Maximum mode system configuration, Direct memory access, Interfacing of D-to-A converter, A-to-D converter, CRT Terminal Interface, Printer Interface, Programming of 8051 timers, 8051 serial interface.

Text Book(s)

1. Microprocessor Architecture, Programming and application with 8085, R.S. Gaonkar, PRI Penram International publishing PVT. Ltd., 5th Edition
Reference Book(s)

1. Microcontrollers: Principles and Application, Ajit Pal, PHI Publication

HONOURS SPECIALIZATION:

AUDIO & VIDEO ENGINEERING

Module I (10 Hours)

1. Fundamentals of Colour Television
   Color TV systems, fundamentals; mixing of colours; colour perception; chromaticity diagram; NTSC, PAL, SECAM systems; colour TV transmitter; (high level, low level); colour TV receivers; remote control; Fault finding and servicing equipments like Wobbuloscope; TV Pattern Generator and Field Strength meter.

Module II (10 Hours)

2. Digital TV and Display Devices
   Introduction to Digital TV; Digital TV signals and parameters; Digital TV Transmitters, MAC signals, advanced MAC signal transmission; Digital TV receivers; Basic principles of Digital Video compression techniques, MPEG Standards; Digital TV recording techniques; Display devices: LED, LCD, TFT, Plasma.

Module III (10 Hours)

3. HDTV
   HDTV standards and systems, HDTV transmitter and receiver/encoder; Digital TV satellite Systems; video on demand; CCTV, CATV, direct to home TV, set top box with recording facility, conditional access system (CAS), 3D TV systems; Digital broadcasting; case study (Cricket match, Marathon, Football match).

Module IV (10 Hours)

4. Fundamentals of Audio-Video Recording
   Methods of sound recording & reproduction, optical recording, CD recording; audio standards, Digital Sound Recording; CD/ DVD player, MP3 player, Blue Ray DVD Players, MPEG, MP3Player.

5. Fundamentals of Acoustics
   Studio acoustics and reverberation; P.A. system for auditorium; acoustic chambers; Cordless microphone system; special types of speakers & microphones; Digital Radio Receiver Satellite radio reception.
Additional Module (Terminal Examination-Internal) (10 Hours)

6. Advanced TV Systems
   IP Audio and Video, IPTV systems, Mobile TV; Video transmission in 3G mobile System; IPod (MPEG4 Video player); Digital Video Recorders, Personal Video Recorders; Wi-Fi Audio /Video Transmitter and Receivers; Video Projectors, HD Video projectors; Video Intercom systems/ Video door phones.

Text Books
2. Video Demystified, Keith jack, Penram International Publication.

Reference Books

ELECTROMAGNETICS ENGINEERING LAB
   (08 Experiments from the following list)

1. Wave-propagation in conductors and dielectrics using HFSS/CST/MATLAB.
2. Current and charge flow of electromagnetic wave in a rectangular waveguide using HFSS/CST/MATLAB.
3. Uniform Plane Wave Propagation in an Arbitrary Direction
4. Transverse Electric Waves in a Parallel-Plate Waveguide
5. To calculate Dispersion and Group Velocity
6. To design Rectangular Waveguide
7. To design cavity Resonator
8. To show the modes of a rectangular waveguide using HFSS.
9. To show azimuth and elevation patterns
10. To show the input and output impedance
11. SWR measurements of rectangular waveguide
12. Reflection of plane waves

*HFSS – High Frequency Structure Simulator
*CST- Computer Simulation Tool
ELECTRICAL MACHINES AND POWER DEVICES LAB
(08 Experiments from the following list)

1. Determination of critical resistance and critical speed from no load test of a DC shunt generator.
2. Plotting of external and internal characteristics of a DC shunt generator.
3. Starting of DC shunt motors by 3-point/4-point starter.
4. Speed control of DC shunt motor by armature control and flux control method.
5. Determination of Efficiency by Open Circuit and Short Circuit test on single phase transformer.
6. Polarity test and Parallel operation of two single phase transformers.
7. Open circuit and Short circuit test of an alternator.
8. Load test of three phase induction motors.

10. Starting of single phase induction motors
11. Study of the V-I characteristics of SCR, TRIAC and DIAC

ELECTRICAL AND ELECTRONICS MEASUREMENTS LAB
(08 Experiments from the following list)

5. Testing of Energy meters (Single phase type).
8. Measurement of Power in a single phase circuit by using CTs and PTs.
10. Design a digital voltmeter using signal processing circuit, ADC and display
11. Study of Spectrum Analyzers
MICROPROCESSORS AND MICROCONTROLLERS LAB
(08 Experiments from the following list)

1. Programs for 16 bit arithmetic operations using 8086.
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
11. Programming and verifying Timer, Interrupts and UART operations in 8051.
12. Communication between 8051 Microcontroller kit and PC.
13. A design problem using 8051 (A problem like multi-parameter data acquisition system, voltmeter, power meter, frequency counter, traffic simulation, digital clock, etc)
### B.Tech(ECE/ETC) Syllabus for admission batch 2015-16

#### 5th Semester

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**PE**

- Fiber Optics and Optoelectronic Devices
- Computer Architecture and Organization
- Power Electronics
- Electromagnetic Interference And Compatibility
- Electronic Devices and Modelling
- Sensors and Transducers
- Object Oriented Programming
- Advanced Analog Electronic Circuits

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**OE**

- JAVA Programming
- Digital VLSI Design
- Digital System Design
- Brain Computer Interfacing
- Optimization in Engineering

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**Total Marks:** 1000

**Total Credits (T+P):** 24

**Honours/Minor Specialization**

- Any one course from PE

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PROFESSIONAL COURSE (PC)
CONTROL SYSTEMS
(3-0-2)

Module-I


Module-II


Module-III

5. **Frequency Response Analysis**: Frequency domain specifications, correlation between Time and Frequency Response with respect to second order system, Polar plots, Bode plot. Determination of Gain Margin and Phase Margin from Bode plot.


Module – IV

7. **Closed loop frequency response**: Constant M circles, Constant N-Circles, Nichol’s chart.

Additional Module (Terminal Examination-Internal)

2. Feedback characteristics of Control Systems: Regenerative feedback.

Text Books


Reference Books

CONTROL AND INSTRUMENTATION LAB

(At least 10 experiments should be done)

List of Experiments:

Control:
1. Study of a dc motor driven position control system
2. Study of speed torque characteristics of two phase ac servomotor and determination of its transfer function
3. Obtain the frequency response of a lag and lead compensator
4. To observe the time response of a second order process with P, PI and PID control and apply PID control to servomotor
5. To study the characteristics of a relay and analyze the relay control system (Phase Plane)
6. To study and validate the controllers for a temperature control system
7. To study the position control system using Synchros

Instrumentation:
1. Measurement of unknown resistance, inductance and capacitance using bridges
2. To plot the displacement-voltage characteristics of the given LVDT
3. Measurement of temperature-voltage characteristics of J-type thermocouple
4. Use a strain gauge to plot the curve between strain applied to a beam and the output voltage
5. Study of resistance-voltage characteristics of Thermistors
6. To study on the interface of PLC with PC for data acquisition applications.
DIGITAL SIGNAL PROCESSING(3-0-2)

MODULE – I
1. The Z-Transform and Its Application to the Analysis of LTI Systems:
   The Z-Transform: The Direct Z-Transform, The Inverse Z-Transform; Properties of
   the Z-Transform; Inversion of the Z-Transforms: The Inversion of the Z-Transform
   by Power Series Expansion, The Inversion of the Z-Transform by Partial-Fraction
   Expansion; Analysis of Linear Time-Invariant Systems in the z-Domain: Response of
   Systems with rational System Functions.
2. The Discrete Fourier Transform: Its Properties and Applications:
   Frequency Domain Sampling: Frequency-Domain Sampling and Reconstruction of
   Discrete-Time Signals, The Discrete Fourier Transform, The DFT as a Linear
   Transformation, Relationship of the DFT to other Transforms; Properties of the DFT:
   Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and
   Circular Convolution, Additional DFT Properties; Linear Filtering Methods Based on
   the DFT: Use of the DFT in Linear Filtering, The Discrete Cosine Transform: Forward
   DCT, Inverse DCT, DCT as an Orthogonal Transform.

MODULE – II
3. Implementation of Discrete-Time Systems:
   Structure for the Realization of Discrete-Time Systems, Structure for FIR Systems:
   Direct-Form Structure, Cascade-Form Structures, Frequency-Sampling Structures;
   Structure for IIR Systems: Direct-Form Structures, Signal Flow Graphs and
   Transposed Structures, Cascade-Form Structures, Parallel-Form Structures.
4. Design of Digital Filters:
   General Considerations: Causality and Its Implications, Characteristics of Practical
   Frequency-Selective Filters; Design of FIR Filters: Symmetric and Antisymmetric FIR
   Filters, Design of Linear-Phase FIR Filters by using Windows, Design of Linear-Phase
   FIR Filters by the Frequency-Sampling Method; Design of IIR Filters from Analog
   Filters: IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear
   Transformation.

MODULE – III
5. Efficient Computation of the DFT: Fast Fourier Transform Algorithm
   Efficient Computation of the DFT: FFT Algorithms: Direct Computation of the
   DFT, Radix-2 FFT Algorithms: Decimation-In-Time (DIT), Decimation-In-Time (DIF);
   Applications of FFT Algorithms: Efficient Computation of the DFT of two Real
   Sequences, Efficient Computation of the DFT a 2N-Point Real Sequence.

MODULE – IV
6. Adaptive Filters:
   Application of Adaptive Filters: System Identification or System Modeling, Adaptive
   Channel Equalization, Adaptive Line Enhancer, Adaptive Noise Cancelling; Adaptive
Direct-Form FIR Filters-The LMS Algorithm: Minimum Mean Square Error Criterion, The LMS Algorithm.

Additional Module (Terminal Examination-Internal)

2. The Discrete Fourier Transform: Its Properties and Applications: Filtering of Long Data Sequences; Frequency Analysis of Signals using the DFT.
3. Efficient Computation of the DFT: Use of the FFT Algorithm in Linear Filtering and Correlation.

Text Books
2. Digital Signal Processing, Tarun Kumar Rawat, Oxford University Press.

Reference Books
2. Digital Signal Processing, S. Salivahan, A. Vallavraj and C. Gnanapriya, TMH.
3. Digital Signal Processing, Manson H. Hayes, Schaum's Outlines, TMH.
DIGITAL SIGNAL PROCESSING LAB

(At least 10 experiments should be done)

1. Familiarization with the architecture of a standard DSP kit (Preferably TMS 320C6XXX DSP kit of Texas Instruments)

2. Generation of various types of waveforms (sine, cosine, square, triangular etc.) using MATLAB and DSP kit.

3. Linear convolution of sequences (without using the inbuilt conv. function in MATLAB) and verification of linear convolution using DSP kit.

4. Circular convolution of two sequences and comparison of the result with the result obtained from linear convolution using MATLAB and DSP kit.

5. (i) Computation of autocorrelation of a sequence, cross correlation of two sequences using MATLAB.

(ii) Computation of the power spectral density of a sequence using MATLAB also implementing the same in a DSP kit.

6. Finding the convolution of a periodic sequence using DFT and IDFT in MATLAB.

7. (i) Implementation of FFT algorithm by decimation in time and decimation in frequency using MATLAB.

(ii) Finding the FFT of a given 1-D signal using DSP kit and plotting the same.

8. Design and implementation of FIR (lowpass and highpass) Filters using windowing techniques (rectangular window, triangular window and Kaiser window) in MATLAB and DSP kit.

9. Design and implementation of IIR (lowpass and highpass) Filters (Butterworth and Chebyshev) in MATLAB and DSP kit.

10. (i) Convolution of long duration sequences using overlap add, overlap save using MATLAB.

(ii) Implementation of noise cancellation using adaptive filters on a DSP kit.
ANALOG COMMUNICATION (3-0-2)

MODULE-I
2. **RANDOM VARIABLES AND PROCESSES:** Probability, Random variables, Useful Probability Density functions, Useful Properties and Certain Application Issues.
3. **AMPLITUDE MODULATION SYSTEMS:** Need for Frequency translation, Amplitude Modulation (Double Side Band with Carrier DSB-C), Single Sideband Modulation (SSB) Other AM Techniques and Frequency Division Multiplexing.

MODULE-II
4. **ANGLE MODULATION:** Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems.
5. **PULSE MODULATION AND DIGITAL TRANSMISSION OF ANALOG SIGNAL:** Analog to Digital (Noisy Channel and Role of Repeater), Pulse Amplitude Modulation and Concept of Time division multiplexing, Digital Representation of Analog Signal.

MODULE-III
6. **MATHEMATICAL REPRESENTATION OF NOISE:** Some Sources of Noise, Frequency-domain Representation of Noise, Superposition of Noises, Linear Filtering of Noise.
7. **NOISE IN AMPLITUDE MODULATION SYSTEM:** Framework for Amplitude Demodulation, Single Sideband Suppressed Carrier (SSB-SC), Double Sideband Suppressed Carrier (DSB-SC), Double Sideband with Carrier (DSB-C).

MODULE-IV
8. **NOISE IN FREQUENCY MODULATION SYSTEM:** An FM Receiving System, Calculation of Signal to Noise Ratio, Comparison of FM and AM, Pre emphasis and De-emphasis and SNR Improvement, Noise in Phase Modulation and Multiplexing Issues, The FM Demodulator using Feedback (FMFB).

Additional Module (Terminal Examination-Internal)
1. **AMPLITUDE MODULATION SYSTEMS:** Radio Transmitter and Receiver.
2. **PULSE MODULATION:** Pulse Width Modulation and Pulse Position Modulation.
3. **SYSTEM NOISE IN FREQUENCY MODULATION:** Threshold in Frequency Modulation, Calculation of Threshold in an FM Discriminator.

Text Books
Reference Books


ANALOG COMMUNICATION LAB

(At least 10 experiments should be done)

1. Analyze and plot the spectrum of following signals with aid of spectrum analyzer:
   Sine wave, square wave, triangle wave, saw-tooth wave of frequencies 1 KHz, 10 KHz, 50 KHz, 100 KHz and 1 MHz.
2. Analyze the process of frequency division multiplexing and frequency division demultiplexing.
3. Study and design of AM modulator and demodulator. (Full AM, SSB, DSBSC, SSBSC)
4. Study of FM modulation and Demodulation Techniques.
5. Observe the process of PAM, quantization and determination of quantization noise.
6. Multiplex 2-4 PAM/PPM and PWM signals.
7. Using MATLAB/LABVIEW generate a carrier and a modulating signal. Modulate the carrier using AM. Show the waveform in time domain and analyze its frequency spectrum. Repeat the simulation for modulating signal being square, triangular and other forms waveform.
8. Using MATLAB/LABVIEW generate a carrier and a modulating signal. Modulate the carrier using FM. Show the waveform in time domain and analyze its frequency spectrum. Repeat the simulation for modulating signal being square, triangular and other forms waveform.
9. Using Lab-View software simulates AM modulation and demodulation system.
10. Using Lab-View software simulate FM modulation and demodulation system.
11. Design a receiver to demodulate and receive the signal from AM radio station.
12. Design a receiver to demodulate and receive the signal from the local FM radio station.

(Verify the process of modulation and demodulation in simulation environment. Analyze frequency spectrum of the signal after modulation and demodulation. Observe the modulated and demodulated signals for different forms of modulation signal)
PROFESSIONAL ELECTIVES (PE):

FIBER OPTICS AND OPTOELECTRONIC DEVICES (3-1-0)

MODULE- I
1. Fundamental of fiber optics, Different generations of optical fiber communication systems. Optical fiber structure, Fiber types, step index fiber and graded index fiber, ray propagation, total internal reflection, Numerical Aperature, acceptance angle. Wave propagation in a cylindrical wave guides, modal concept, V-number, power flow in step index fiber and graded index fiber, attenuation (absorption, scattering and bending) and dispersion (inter and intramodal, chromatic, wave guide and polarization) in fiber, dispersion shifted and dispersion flattened fiber

MODULE-II

MODULE- III
3. Optoelectronic Detector, PIN AND APD, Responsivity, Band width, Detector noise equivalent circuit and SNR calculation.
4. Optoelectronic Modulators, Basic principle, Electro optic and Acousto optic modulators.

MODULE – IV
5. Optical Amplifier, Semiconductor optical Amplifier and Erbium Doped Fiber Amplifier.

Additional Module (Terminal Examination-Internal)
1. WDM components-couplers, isolators, circulators, filters. Optical switching- self electro optic effect Device, switching speed and energy

Text Books
3. Fiber optics and Optoelectronics, R.P.Khare, Oxford University Press.

Reference Books
COMPUTER ARCHITECTURE AND ORGANISATION (3-1-0)

MODULE-I
1. Introduction

2. Fixed Point Arithmetic, Addition, Subtraction, Multiplication and division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth’s algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth’s Algorithm.

MODULE-II
3. Control Design
Hardwired Control, Micro programmed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming

MODULE–III
4. System Organization
Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance.

MODULE –IV
5. Memory Organization
Random access memories, serial-access memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory

Additional Module (Terminal Examination-Internal)

Textbooks

References Books
POWER ELECTRONICS (3-1-0)

MODULE-I
1. **Power electronics devices:**

2. **Triggering techniques:**
   Turn on circuits for SCR – triggering with single pulse and train of pulses synchronizing with supply – triggering with microprocessor – forced commutation – different techniques – series and parallel operations of SCRs.

MODULE-II
3. **Controlled rectifiers:**
   Converters – single phase – three phase – half controlled and fully controlled rectifiers – Waveforms of load voltage and line current under constant load current – effect of transformer leakage inductance – dual converter

MODULE-III
4. **Inverters:**
   Voltage and current source inverters, resonant, Series inverter, PWM inverter. AC and DC choppers – DC to DC converters – Buck, boost and buck-boost.

MODULE-IV
5. **Industrial applications**
   DC motor drives – Induction and synchronous motor drives – switched reluctance and brushless motor drives.

**Additional Module (Terminal Examination-Internal)**

**Text Books**

**Reference Books**
4. Power Electronics, V.R. Moorthy, Oxford University Press, 2005
ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY (3-1-0)

MODULE-I

1. Overview of EMI/EMC:
   Electromagnetic environment, History, Concepts and definitions, Overview of EMI/EMC, Natural and Nuclear sources of EMI, conducted and radiated EMI, Transient EMI, Time domain Vs Frequency domain EMI, Units of measurement parameters.

2. EMI Coupling Principles:
   Electromagnetic emissions, noise from relays and switches, Nonlinearities in circuits, passive inter-modulation, cross talk in transmission lines, transients in power supply lines, Conducted, Radiated and Transient Coupling, Common Impedance Ground Coupling.

MODULE-II

3. Radiated and Conducted Interference Measurements:
   EMI Test Instruments/ Systems, Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents/voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI, detectors and measurements, EMI Shielded Chamber, Open Area Test Site, TEM Cell, Sensors/ Injectors/ Couplers, Test beds for ESD and EFT.

MODULE-III

4. EMI Control Techniques:
   Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design shielding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting, PCB Traces Cross Talk.

MODULE-IV


Additional Module (Terminal Examination-Internal)

6. Radiated Common Mode and Ground Loop Coupling, Radiated Differential Mode Coupling, Cable to Cable Coupling, Power Mains and Power Supply coupling.

Reference Books

ELECTRONICS DEVICES AND MODELING (3-1-0)

MODULE – I

MODULE – II

MODULE – III
3. BJT Parameter Measurements: Input and Model Parameters, Parameter Measurements,
4. MOST Parameter Measurements: LEVEL1 Model Parameters, LEVEL2 Model (Long-Channel) Parameters, LEVEL2 Model (Short-Channel) Parameters, LEVEL3 Model Parameters, Measurements of Capacitance, BSIM Model Parameter Extraction

Noise and Distortions: Noise, Distortion.

MODULE – IV

Additional Module (Terminal Examination-Internal)
6. BSIM1, BSIM2, SPICE3, HSPICE and PSPICE Models

Textbooks

Reference Books
SENSORS AND TRANSDUCERS (3-1-0)

MODULE-I
Elements of a general measurement system; Static Characteristics: systematic characteristics, statistical characteristics, calibration; Dynamic characteristics of measurement systems: transfer functions of typical sensing elements, step and frequency response of first and second order elements, and dynamic error in measurement systems.

MODULE-II
Sensing elements: Resistive sensing elements: potentiometers, Resistance Temperature Detector (RTD), thermistors, strain gages. Capacitive sensing elements: variable separation, area and dielectric; Inductive sensing elements: variable reluctance and LVDT displacement sensors.

MODULE-III

MODULE-IV
Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems, cold junction compensation. IC temperature sensor Elastic sensing elements: Bourdon tube, bellows, and diaphragms for pressure sensing, force and torque measurement.

Additional Module (Terminal Examination-Internal)
Electromagnetic sensing elements: velocity sensors

Text Books:

Reference Books:
OBJECT ORIENTED PROGRAMMING(3-1-0)

MODULE- I
1. Introduction to object oriented programming: user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

MODULE-II
2. Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references. Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.


Module-III

5. Template: template classes, template functions.

Module-IV
6. Operator overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators.

7. Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration.

Additional Module (Terminal Examination-Internal)
1. Namespaces: user defined namespaces, namespaces provided by library.

Text Books:
2. ANSI and Turbo C++, Ashoke N. Kamthane, Pearson Education.

Reference Books:
2. C++ and Object Oriented Programming, DJana, PHI Learning.
ADVANCED ANALOG ELECTRONIC CIRCUITS (3-1-0)

MODULE-I


2. **Oscillators**: Oscillators: Oscillator Principles, Oscillator Types, Quadrature Oscillator, Saw tooth wave generator, Voltage-controlled oscillator.

3. **Comparators**: Comparators: basic comparator, zero-crossing detector, Schmitt trigger, comparator characteristics, limitations of Op-Amp as comparators, voltage limiters.

MODULE-II

4. **Bistable Multivibrator**: Bistable Multivibrator, fixed-bias bistable multi vibrator, Loading, self-biased transistor binary, commutating capacitors, Triggering the binary, Unsymmetrical Triggering of the bistable multivibrator, Triggering Un symmetrically through a Unilateral Device, Triggering, Triggering of a Bistable Multi Symmetrically without the Use of Auxiliary Symmetrical Diodes, Schmitt Trigger Circuit (Emitter-coupled Bistable Multivibrator)


MODULE-III


8. **Voltage and Current Time Base Generators**: Time-Base Generators, General features of a Time-base signal, Methods of generating a voltage time-base waveform,
Exponential sweep circuit, Miller and bootstrap time base generators—Basic principles, Transistor miller time base generator, Transistor bootstrap time base generator, Current Time-Base Generators, A Simple Current sweep, Linearity Correction through adjustment of driving waveform, Transistor current time base generator.

MODULE-IV


Additional Module (Terminal Examination-Internal)


Text Books

3. OP-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Publication.

Reference Books

1. OP-Amps and Linear Integrated Circuits, Robert F. Coughlin, Frederick F. Driscoll, Pearson Education Publication.
2. Pulse and Digital Circuits, A. Anand Kumar, PHI.
JAVA PROGRAMMING (3-1-0)

MODULE – I
1. Introduction to Java and Java programming Environment. Object Oriented Programming. Fundamental Programming Structure: Data Types, variable, Typecasting Arrays, Operators and their precedence. Control Flow: Java's Selection statements (if, switch, iteration, statement, while, do-while, for, Nested loop). Concept of Objects and Classes, Using Exiting Classes building your own classes, constructor overloading, static, final, this keyword.
3. Packages & Interfaces: Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended.
4. Exception Handling: Fundamentals, Types Checked, Unchecked exceptions, Using try & catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception.

Module - II
5. Multi Threading: Java Thread Model, Thread Priorities, Synchronization, Creating a thread, Creating Multiple threads, Using is Alive () and join (), wait () & notify ()
6. String Handling: String constructors, String length, Character Extraction, String Comparison, Modifying a string
7. Java I/O: Classes & Interfaces, Stream classes, Byte streams, Character streams, Serialization. JDBC: Fundamentals, Type I, Type II, Type III, Type IV drivers.

Module - III
8. Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet context and show documents ()
10. AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame, Canvas, Creating a frame window in an Applet, working with Graphics, Control Fundamentals, Layout managers, Handling Events by Extending AWT components. Core java API package, reflection, Remote method Invocation (RMI)
Module – IV

Additional Module (Terminal Examination-Internal)

Text Books

Reference Books
2. Programming with Java, Jaya MaheshBhave & SunilPatekar, Pearson Education.
5. Java How to Program, H.M. Deitel & Paul J. Deitel, PHI, 8th Edition
6. Theory and Problems of Programming with JAVA, John Hubbard, TMH.
DIGITAL VLSI DESIGN (3-1-0)

Module I


Module II

4. **MOS Inverters – Static Characteristics**: Introduction, Resistive-Load Inverters, Inverters with n-Type MOSFET Load, CMOS Inverter.


Module III

7. **Sequential MOS Logic Circuits**: Introduction, Behaviour of Bistable Elements, SR Latch Circuits, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.


Module IV

9. **Design for Testability**: Introduction, Fault Types and Models, Ad Hoc Testable Design Techniques, Scan-Based Techniques, Built-In Self-Test (BIST) Techniques, Current Monitoring \( I_{DDQ} \) Test.
Additional Module (Terminal Examination-Internal)

10. **Semiconductor Memories**: Introduction, Dynamic Random Access Memory (DRAM), Static Random Access Memory (SRAM), Non-volatile Memory, Flash Memory.

**Text Books**

**Reference Books**
6. *VLSI Design Technique for Analog and Digital Circuits*, R LGEIGER, TMH.
8. *Introduction to VLSI Systems a logic, Circuits and System*, Ming BOLin, BSP BOOKS PVT LTD.

**DIGITAL SYSTEM DESIGN**(3-1-0)

**MODULE-I**
1. **Combinational Logic**: Review of adders, Subtractor, Multipliers, Multiplexers, ROM, PLA, PAL and PLD.
2. **Synchronous Sequential Logic**: Flip-flops, Triggering of flip-flops, Analysis of clocked sequential circuits, State reduction and assignment, Flip-flop excitation tables, Design procedure, Design of counters,

**MODULE-II**
3. **Finite State Machines**: Finite state model, Memory elements and their excitation functions, Synthesis of Synchronous sequential circuits, Capabilities and limitations of FSM, Design, Modeling and Simulation of Moore and Mealy machines.

**MODULE-III**
4. **Asynchronous Sequential Logic**: Analysis Procedure, Circuits with latches, Design procedure, Reduction of state and flow tables, Race-free state assignment, Hazards, Design examples.
Module – IV

5. Designing with Programmable Logic Devices and Programmable Gate Arrays:
   Read only memories, Programmable logic arrays, Programmable array logic, Designing with FPGAs, Xilinx series FPGA

Additional Module (Terminal Examination-Internal)

6. Algorithmic State Machines: ASM chart, Timing considerations, Control implementation, Control Design with multiplexers, PLAs, etc.

Text Books

4. Reference Books

**BRAIN COMPUTER INTERFACING(3-1-0)**

MODULE-I

1. Anatomy and physiology of the human brain, Brain signal processing: Laplacian Filtering, Nearest Neighbour Filtering, Time-domain features including Hzorth parameters, Frequency domain features including power spectral density.

MODULE-II

2. Feature Selection: Principal Component Analysis, Independent Component Analysis, Common spatial patterns. EEG Classification: Linear Discriminant Analysis, Quadratic Discriminant analysis.

MODULE-III

3. Applications in rehabilitative robotics, olfactory perceptual-ability detection, cognitive failure detection in driving and detection of true emotion or deception using Brain-Computer Interfacing.

MODULE-IV

4. Neural Classifier using Gradient Descent Learning and Back-propagation algorithm, Linear and Kernelized Support Vector Machines

Additional Module (Terminal Examination-Internal)

5. Time-frequency correlated features including wavelets

Reference Books

1. BRAIN-COMPUTER INTERFACING: AN INTRODUCTION, RAJESH P.N. RAO, CAMBRIDGE UNIVERSITY PRESS, 1ST EDITION.
OPTIMIZATION IN ENGINEERING (3-1-0)

MODULE-I
1. Idea of Engineering optimization problems, Classification of optimization algorithms, modeling of problems and principle of modeling.
2. Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method, Sensitivity analysis in linear programming

MODULE-II
3. Transportation problems: Finding an initial basic feasible solution by Northwest Corner rule, Least Cost rule, Vogel’s approximation method, Degeneracy, Optimality test, MODI method, Stepping stone method
4. Assignment problems: Hungarian method for solution of Assignment problems
5. Integer Programming: Branch and Bound algorithm for solution of integer Programming Problems

MODULE-III
6. Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method
7. Constrained optimization with inequality constraint: Kuhn-Tucker condition, Quadratic programming.

MODULE-IV
8. Queuing models: General characteristics, Markovian queuing model, M/M/1 model, Limited queue capacity, multiple server, Finite sources, Queue discipline.

Additional Module (Terminal Examination - Internal)
9. Introduction to Genetic Algorithm.

Text Books
2. Operation Research, Prabakar Pai, Oxford University Press

Reference Books
ADVANCE LAB:

VLSI AND EMBEDDED SYSTEMS LAB

(All the experiments should be done)

VLSI Experiment List:
1. Design of schematic and simple layout for CMOS Inverter & perform parasitic extraction and simulation.
2. Design of schematic and simple layout for CMOS NAND gate & perform parasitic extraction and simulation.
3. Design of schematic and simple layout for CMOS NOR gate & perform parasitic extraction and simulation.
4. Plotting of VTC curve of CMOS inverter using p-SPICE.
5. Modelling and transient analysis of 2-inputs NAND & NOR gates using p-SPICE.
6. Design & implementation of 16-bit Arithmetic & Logic unit using VHDL.

Embedded Systems Experiment List:
2. Study of Interrupt structure in ARM Processors.
3. Write ARM Processor program to Flash LED.
4. Interfacing of an LCD Display.
5. Write a program to interface an ADC.
6. Write a program to control a Stepper Motor.
7. Write a program to control the speed of DC motor.
8. Interface relays and write a program to control them.
9. Interface ZIGBEE with ARM to control more external devices.
10. Interfacing RFID module with ARM Microcontroller.
# Sixth Semester

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<th>Code</th>
<th>Course Name</th>
<th>Hours/week L/T</th>
<th>Credit Theory</th>
<th>University Marks</th>
<th>Internal Evaluation</th>
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<td>Digital Communication</td>
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<td>PE</td>
<td>Information Theory &amp; Coding/Computer Network &amp; Data Communication/Mobile Communication/Biomedical Electronics/Industrial Electronics/Robotics &amp; computer Vision/Pattern Analysis &amp; Machine Intelligence/Analog VLSI Design</td>
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| Total | 19 | 18 | 500 | 300 | 13 | 6 | 300 |

Total Marks: 1100

Total Credits: 24

Honours Specialization: - Cryptography and network security
Minor Specialization: - Signals & systems (as in 3rd semester syllabus)
PROFESSIONAL COURSE (PC):

DIGITAL COMMUNICATION TECHNIQUE(3-0-2)

MODULE – I (19 HOURS)
Sampling Theorem, Some applications of sampling theorem.
**Digital Representation of Analog Signal** - Quantization of Signals, Quantization error, PCM, Electrical representation of binary digits, PCM System, Companding (4); Line coding, scrambling, T1 Digital System, Multiplexing T1 lines – The T2, T3 and T4 lines (3); Differential PCM- Linear predicted design, Delta Modulation, and Adaptive Delta Modulation.

**Noise in PCM and DM** - Calculation of Quantization Noise, Output Signal Power, Thermal Noise, Output SNR in PCM, Quantization noise in Delta Modulation, output signal power, output SNR, Comparison with PCM and DM.

MODULE – II (7 HOURS)
**Digital Modulation Technique** - Generation, Transmission, Reception; Spectrum and Geometrical Representation in the Signal Space of BPSK, DPSK, QPSK, QASK, M-ary PSK, BFSK, M-ary FSK, and Minimum Shifting Keying (MSK).

MODULE – III (8 HOURS)
**Principle of Digital Data Transmission** - Digital Communication Systems – Source, Line coder, Multiplexer, Regenerative repeater; Line Coding- PSD of various line codes, polar signalling, constructing a DC Null in PSD by pulse shaping, On Off signalling, Bipolar signalling; Pulse shaping – ISI and effect, Nyquist first criterion for zero ISI; Scrambling, Digital receiver and regenerative repeaters; Equalizers, Timing extraction, Detection error, Eye Diagram.

MODULE-IV (4 HOURS)
**Data Transmission** - A base band signal Receiver, Peak signal to RMS noise output voltage ratio, probability of error, optimum threshold, optimum receiver for both base band and pass band: calculation of optimum filter transfer function, optimum filter realization using Matched filter, Probability error of the matched filter, optimum filter realization using correlator.

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
1. **Multiple Access Techniques**- FDMA, TDMA, CDMA, OFDM, MIMO

TEXT BOOKS

REFERENCE BOOKS
DIGITAL COMMUNICATION TECHNIQUES LAB

(At least 10 experiments should be done)

List of Experiments:

1. Study the functioning of PCM and Delta modulator; Demonstrate the process of PCM modulation and Delta modulation.
2. Modulation generation and detection Signal generator CRO
3. To study Time division multiplexing.
4. To study the different channel coding and decoding technique.
5. Generation and reception of different types of signals like ASK, PSK, FSK.
6. To transmit and receive three separate signal audio, video, tone simultaneously through satellite link.
7. To transmit PC data through satellite link using a satellite communication demonstration unit.
8. Experimentally compare different forms of BPSK, QPSK, and OQPSK and analyze their Spectrum with spectrum analyzer.
9. Spreading and dispreading using additive white Gaussian noise generation/ Gold code and other forms of spreading techniques.
10. Transmit different types of signals using ISDN system.
11. Analyze the process of data communication in LAN using LAN trainer and compare the performance different media access techniques.
MICROWAVE AND RADAR ENGINEERING (3-0-2)

MODULE-I (10 HOURS)
Microwave Tubes- Limitations of conventional tubes, construction, operation; Properties of Klystron Amplifier, reflex Klystron, Magnetron, Travelling Wave Tube (TWT); Backward Wave Oscillator (BWO); Crossed field amplifiers.

MODULE-II (10 HOURS)
Microwave Solid State Devices- Limitation of conventional solid state devices at Microwaves; Transistors (Bipolar, FET); Diodes (Tunnel, Varactor, PIN), Transferred Electron Devices (Gunn diode); Avalanche transit time effect (IMPATT, TRAPATT, SBD); Microwave Amplification by Stimulated Emission of Radiation (MASER).

MODULE-III (10 HOURS)
Microwave Components- Analysis of Microwave components using s-parameters, Junctions (E, H, Hybrid), Directional coupler; Bends and Corners; Microwave posts, S.S. tuners, Attenuators, Phase shifter, Ferrite devices (Isolator, Circulator, Gyrorator); Cavity resonator.

MODULE-IV (12 HOURS)
Introduction to Radar Systems- Basic Principle-Block diagram and operation of Radar; Radar range Equation; Pulse Repetition Frequency (PRF) and Range Ambiguities.
Doppler Radars- Doppler determination of velocity, Continuous Wave (CW) radar and its limitations, Frequency Modulated Continuous Wave (FMCW) radar, Basic principle and operation of Moving Target Indicator (MTI) radar, Delay line cancellers, Blind speeds and staggered PRFs.
Scanning and Tracking Techniques- Various scanning techniques (Horizontal, vertical, spiral, palmer, raster, nodding); Angle tracking systems (Lobe switching, conical scan, mono pulse).

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
Microwave Measurements- Power measurements using calorimeters and bolometer; Measurement of Standing Wave Ratio (SWR), Frequency and wavelength; Microwave bridges; Matched termination.
Applications of Radar; Range tracking systems, Doppler (velocity) tracking systems.

TEXT BOOKS
3. Microwave and Radar Engineering, G. S. Rao, Pearson India Publisher, 2014

REFERENCE BOOKS
4. Microwave Engineering, Subol Kar, University Press.
MICROWAVE ENGINEERING LAB

(At least 10 experiments should be done)

LIST OF EXPERIMENTS:

1. Study of microwave components and instruments.
2. Measurement of crystal characteristics and proof of the square law characteristics of the diode.
8. Calibration of the attenuation constant of an attenuator.
9. Determination of the radiation characteristics and gain of an antenna.
11. Determination of the standing wave pattern on a transmission line and finding the length and position of the short circuited stub.
PROFESSIONAL ELECTIVES (PE-I)

INFORMATION THEORY & CODING (3-1-0)

MODULE-I

Basic Concepts of Information Theory- The concept of Amount of Information, Average Information, Entropy, Information rate, Mutual information; Shannon's Theorem, Channel capacity; BSC and other channels, Capacity of a Gaussian Channel, Bandwidth – S/N Tradeoff; Introduction to Channel Capacity & Coding; Channel Models, Channel Capacity Theorem, Shannon Limit.

MODULE-II

Introduction to Error Control Coding- Linear Block Codes- Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, Hamming Code.

Cyclic Codes- Description of Cyclic codes, Generator and parity check matrices of cyclic codes, error detection decoding of cyclic codes.

BCH Codes- Description of codes; Decoding of BCH codes; Implementation of error connection.

MODULE-III

Convolution Codes- Encoding of convolution codes; structural properties of Convolution codes; Distance Properties of convolution codes.

Automatic Repeat Request Strategies- Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

MODULE-IV

Discrete Messages and information content- The Concept of amount of Information, Average Information, Entropy; Information rate, Source coding to increase average information per bit; Shannon-Fano coding; Huffman source coding algorithm, Lempel Ziv source coding algorithm.

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

Shanon's Theorem- Channel Capacity, Capacity of Gaussian channel, Bandwidth – S/N Trade off; Use of Orthogonal Signals to attain Shannon's limit; Matched Filter Reception, calculation of error probability, Efficiency of orthogonal Signal transmission.

TEXT BOOKS

1. Information Theory, Coding and Cryptography, Runjan Bose, TMH Publication
2. Introduction to Error Control Codes, S Gravano, Oxford University Press

REFERENCE BOOKS

3. Error Control Coding, Shu Lin & J Costeib, PHI
COMPUTER NETWORK & DATA COMMUNICATION (3-1-0)

MODULE – I (12 HRS)
Overview of Data Communications and Networking
Physical Layer - Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment.

MODULE – II (12 HRS)

Data Link Layer
Data Link Control and Protocols- Flow and Error Control, Stop-and-wait ARQ, Go-Back N ARQ, Selective Repeat ARQ, HDLC; Point-to Point Access: PPP- Point –to- Point Protocol, PPP Stack, Multiple Access, Random Access, Controlled Access, Channelization; Local area Networks: Ethernet- Traditional Ethernet, Fast Ethernet, Gigabit Ethernet; Wireless LANs-IEEE 802.11, Bluetooth virtual circuits.

MODULE – III (12 HRS)

Network Layer
Host to Host Delivery- Internetworking, addressing and Routing; Network Layer Protocols- ARP, IPV4, ICMP, IPV6 ad ICMPV6.

Transport Layer
Process to Process Delivery- UDP, TCP; congestion control and Quality of service.

MODULE-IV

Application Layer
Client Server Model- Socket Interface; Domain Name System (DNS); Electronic Mail (SMTP) and file transfer (FTP); HTTP and WWW.

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
1. Digital Transmission- More about signals; Line coding, Block coding, Sampling, Transmission mode.
2. Analog Transmission- Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing- FDM, WDM, TDM,
3. Transmission Media- Guided Media, Unguided media (wireless)
5. Error Detection and correction- Types of Errors, Detection, Error Correction
6. Frame Relay and ATM.

TEXT BOOKS
3. Data Communication and Networks, Bhushan Trivedi, Oxford University Press

REFERENCE BOOKS
3. Data communication & Computer Networks, Gupta,Prakash C, Prentice Hall of India
MOBILE COMMUNICATION (3-1-0)

MODULE-I

MODULE-II

MODULE-III
Wireless Application and Standards - Fundamentals of WLAN transmission technology, WLAN applications, IEEE 802.11, 802.11 systems performance; WiMAX standards, WiFi standards, Zigbee.

MODULE-IV
Multiple Access Techniques - Introduction, Narrowband Channelized Systems, Comparisons of FDMA, TDMA and DS-CDMA, Comparison of DS-CDMA vs. TDMA; System Capacity, Multicarrier DS-CDMA (MC-DS-CDMA).

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

TEXT BOOKS
2. Wireless communication & networks, Upena Dalal, Oxford University Press, 2014

REFERENCE BOOKS
1. Wireless Communications, T S Rappaport, Pearson Education, India
BIOMEDICAL ELECTRONICS (3-1-0)

MODULE-I
Bioelectric Signals and Electrodes- Sources of biomedical signals, basic medical instrumentation system, PC based medical instruments, general constraints in design of medical instrumentation systems; origin of bioelectric signals, Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Electrooculogram (EOG); Electrode-tissue interface, polarization, skin contact impedance, motion artifacts, Silver Chloride electrodes, Electrodes for ECG, Electrodes for EEG, Electrodes of EMG, Electrical conductivity of electrode jellies and creams, microelectrodes; Electrocardiograph-block diagram, ECG leads, effects of artifacts, multi-channel,

MODULE-II
Pacemakers & Defibrillator- Need for cardiac pacemaker, external pacemaker, implantable pacemakers-types, ventricular synchronous demand pacemaker, programmable pacemaker, power sources for implantable pacemakers; Need for defibrillator, DC defibrillator, automatic external defibrillator, implantable defibrillators.

MODULE-III
Blood Flow & Cardiac Output Measurement- Electromagnetic blood flow meter-principle, square wave electromagnetic flow meter, Doppler shift ultrasonic flow meter
Advanced Diagnostic & Therapeutic Instruments- Principle of surgical diathermy &surgical diathermy machine, Electro diagnosis-Electrotherapy-functional block diagram and working, interferential current therapy.

MODULE-IV

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

1. ECG machine, vector cardiograph, phonocardiograph-origin of heart sounds; Microphones and amplifiers for PCG; Artificial kidney-Principle and haemodialysis machine; Continuous measurement of chemical quantities.

TEXT BOOK
ROBOTICS AND COMPUTER VISION (3-1-0)

MODULE-I
Robotics Fundamentals- Components, degrees of freedom, joints, reference frames, characteristics.
Kinematics- Transformations and their representation using matrix, forward and inverse kinematic equations; Denavit- Hardenberg representation, degeneracy and dexterity.

MODULE-II
Computer Vision Fundamentals- Relationships to other fields, image geometry, definitions, levels of computation.
Binary image processing- Geometric processing, binary algorithms (e.g., component labelling, distance transforms, medial axis)

MODULE-III
Regions and segmentations- Thresholding, region representation, split and-merge.
Hough Transform- Theory and applications

MODULE-IV
Differential motions and velocities- Jacobian, differential motions of a frame, Jacobian and the differential operator.
Image filtering- Histograms, linear systems, mean and median filters, Gaussian smoothing

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
1. Trajectory Planning- Joint-space and Cartesian-space trajectories.
2. Edge detection- Gradients, first and second derivative operators

TEXT BOOKS
PATTERN ANALYSIS AND MACHINE INTELLIGENCE (3-1-0)

MODULE-I
1. Statistical Pattern Classification- Linear discriminant analysis, Bayesian classification, model-free technique including the K-nearest neighbours method.

MODULE-II
2. Feature Minimization Techniques- Principal component analysis, Independent component analysis.
3. Intelligent Search- Problem solving by search, Heuristic search.

MODULE-III
4. Reasoning Using Logic- Propositional and predicate logic, unification and resolution principle, deductive and abductive reasoning, fuzzy reasoning.

MODULE-IV

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
8. Neural Classifiers- Perceptron, Multi-layered perceptrons and back propagation algorithm, support vector machine classifier.

TEXT BOOK
1. Pattern Recognition and machine learning – Christopher M.Bishop, Springer
3. Artificial Intelligence – Stuart Russel, Peter Norvig-third edition
ANALOG VLSI DESIGN(3-1-0)

MODULE - I (10 HOURS)

1. Introduction to Analog Design- General Concepts, Levels of Abstraction, Robust Analog Design.
2. Single-Stage Amplifiers- Basic Concepts, Common-Source Stage, Common-Source Stage with Resistive Load, CS Stage with Diode-Connected Load, CS Stage with Current-Source Load, CS Stage with Triode Load, CS Stage with Source Degeneration, Source Follower, Common-Gate Stage, Cascode Stage, Folded Cascode.

MODULE – II (12 HOURS)

4. Passive and Active Current Mirrors- Basic Current Mirrors, Cascode Current Mirrors, Active Current Mirrors, Large-Signal Analysis, Small-Signal Analysis, Common-Mode Properties.

MODULE-III (7 HOURS)

7. Frequency Response of Amplifiers- General Considerations, Miller Effect, Association of Poles with Nodes, Common-Source Stage, Source Followers, Common-Gate Stage, Cascode Stage, Differential Pair.

MODULE – IV (7 HOURS)


ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

9. Oscillators- General Considerations, Ring Oscillators, LC Oscillators, Crossed-Coupled Oscillator, Colpitts Oscillator, One-Port Oscillators, Voltage-Controlled Oscillators, Tuning in Ring Oscillators, Tuning in LC Oscillators, Mathematical Model of VCOs.
TEXT BOOKS

REFERENCE BOOKS
PROFESSIONAL ELECTIVES (PE-II)

OPERATING SYSTEM (3-1-0)

MODULE-I
1. **Introduction to operating system**- About an Operating System, Simple Batch Systems, Multiprogramming and Time Sharing systems; Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems.
2. **Operating System Structures**- Operating System Services, System components, Protection system, Operating System Services, system calls.
3. **Process management**- Process Concept, Process Scheduling, Operation on Processes, Inter process communication, Examples of IPC Systems, Multithreading Models, Threading Issues, Process Scheduling Basic concepts, scheduling criteria, scheduling algorithms,

MODULE-II
5. **Deadlocks**- System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, recovery from Deadlock.

MODULE-III
6. **Memory management**- Memory Management strategies, Logical versus Physical Address space, swapping, contiguous Allocation, Paging, Segmentation
7. **Virtual Memory**- Background, Demand paging, performance of Demand paging, Page Replacement, Page Replacement Algorithms; Allocation of frames, Thrashing, Demand Segmentation.

MODULE-IV

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
9. Thread Scheduling,
10. Case studies: The LINUX System, Windows, POSIX compliant

TEXT BOOKS

REFERENCE BOOKS
ANTENNAS & WAVE PROPAGATION (3-1-0)

MODULE- I

MODULE-II
Wire antennas- Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array

MODULE- III
Aperture Antennas- Magnetic Current and its fields, Uniqueness theorem, Field equivalence principle, Duality principle, Method of Images, Pattern properties, Slot antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat reflector, Corner Reflector, Common curved reflector shapes, Lens Antenna

MODULE- IV

Antenna Measurements- Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber measurement.

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

TEXT BOOKS

REFERENCES BOOKS
SPEECH PROCESSING (3-1-0)

MODULE- I

MODULE- II

MODULE- III
Frequency domain method for speech processing- Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Homomorphic vocoder speech analysis: Cepstral analysis of Speech, Formant Estimation, Homomorphic and speech vocoder.

MODULE- IV

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

TEXT BOOKS

REFERENCE BOOKS
COMMUNICATION SYSTEM MODELING AND SIMULATION (3-1-0)

MODULE-I
Simulation methodology- Introduction, Aspects of methodology, Performance Estimation, Sampling frequency, Low pass equivalent models for band pass signals, multicarrier signals, Non-linear and time varying systems, Post processing, Basic Graphical techniques and estimations

MODULE-II
Simulation of random variables random process- Generation of random numbers and sequence, Gaussian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

MODULE-III
Modelling of communication systems- Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

MODULE-IV
Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
Simulation and modeling methodology- Simulation environment, Modelling considerations, Performance evaluation techniques, error source simulation, Validation

TEXT BOOKS

REFERENCE BOOKS
SUPER ELECTIVE (SE) (TO BE DEFINED BY THE INSTITUTE)

ONE SUBJECT IS MENTIONED HERE AS AN EXAMPLE.

THEORY OF CODE DIVISION MULTIPLE ACCESS COMMUNICATION

(3-1-0)

MODULE-I
Introduction to Spread Spectrum Communication Systems, Reception of Spread Spectrum Signals in AWGN Channels, Forward Error Control Coding in Spread Spectrum Systems. CDMA Communication on Fading Channels,

MODULE-II
Pseudo random Signal generation, Synchronization of Pseudorandom Signals, Information-Theoretical Aspects of CDMA Communications, CDMA Cellular Networks.

MODULE-III
Optical code division multiple access: a historical perspective, optical CDMA codes, fundamental limits and OCDMA performance, coherent optical CDMA systems, incoherent optical CDMA systems.

MODULE- IV
Hybrid multiplexing Techniques (OCDMA, TDMA, WDM,

ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)
Optical CDMA network security, optical CDMA network architectures and applications.

TEXT BOOK
2. Optical code division multiple access fundamentals and applications, Paul R. Prucnal, CRC Press.

ADVANCED LAB

PROJECTS ON

INTERNET OF THINGS/EMERGING TECHNOLOGIES (0-0-8)

   OR
   1. Or to carry out project on any latest emerging technologies
HONOURS SPECIALIZATION:

CRYPTOGRAPHY AND NETWORK SECURITY (4-0-0)

MODULE-I

Security Problems- Security problem in computing; Security Attacks; Security Services; Security Mechanisms; OSI security attack-Standards and standard setting organizations.

MODULE-II

Data Security- Basic encryption and decryption; Substitution, Transposition, Block ciphers, Data encryption, standard encryption and decryption; Differential and linear crypto analysis; Advanced encryption; Block cipher models-Triple DES with two keys-Stream cipher, RC4- RSA algorithm, Diffie-Hellman key exchange algorithm.

MODULE- III


MODULE- IV


ADDITIONAL MODULE (TERMINAL EXAMINATION-INTERNAL)

System Security: Intruders and intrusion detection-Malicious software, Viruses and related threats, virus counter measures, distributed denial of services attack-Firewalls design principles-Trusted systems.

TEXT BOOKS

2. Everyday Cryptography- Fundamental Principles and Applications, Keith M. Martin, Oxford University Press

REFERENCE BOOKS

MINOR SPECIALIZATION:

SIGNALS & SYSTEMS (4-0-0)

MODULE - I (10 HOURS)
1. Discrete-Time Signals and Systems:

MODULE - II (10 HOURS)
1. The Continuous-Time Fourier Series:
   Basic Concepts and Development of the Fourier series; Calculation of the Fourier Series, Properties of the Fourier Series.
2. The Continuous-Time Fourier Transform:
   Basic Concepts and Development of the Fourier Transform; Properties of the Continuous-Time Fourier Transform.

MODULE- III (10 HOURS)
1. The Z-Transform and Its Application to the Analysis of LTI Systems:

MODULE- IV (6 HOURS)
1. The Discrete Fourier Transform: Its Properties and Applications:

ADDITIONAL MODULE (TERMIAL EXAMINATION-INTERNAL) (04 HOURS)
1. Properties of Continuous-Time Systems:
   Block Diagram and System Terminology; System Properties: Homogeneity, Time Invariance, Additivity, Linearity and Superposition, Stability, Causality.

TEXT BOOKS
2. Fundamentals of Signals and Systems - M. J. Roberts, TMH

REFERENCE BOOKS
1. Signals and Systems - P. Ramakrishna. Rao, TMH.
2. Signals and Systems – A NagoorKani, TMH
3. Signals and Systems, Chi-Tsong Chen, Oxford
5. Principles of Linear Systems and Signals, B.P Lathi, Oxford
### Final Year Engineering
#### Seventh Semester

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Total Credits: 24

**Honours Specialization:**
Telecommunication network and optimization

**Minor Specialization:**
VLSI design

# To be conducted by Training & Placement Department of the College.
7th Semester

NANO SCIENCE & BIO TECHNOLOGY

"will be uploaded soon"
SOFT COMPUTING

3-0-2

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh’s compositional rule of inference; Defuzzification ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adaline- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS).

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

ADDITIONAL MODULE (Terminal Examination-Internal)
Applications to Different Engineering problems.

Text Books


Reference Books


5) V. Keeman, “Learning and Soft computing”, Pearson Education, India.

SOFT COMPUTING LAB
(All the experiments are compulsory)

List of experiments:

1) Study of fundamental of Fuzzy Logic and Basic Operations.
2) Study of Fuzzy Weighted Average and Application.
3) Solve a given problem (operations) using Fuzzy logic in MATLAB.
4) Solve a given problem (Max-Min composition) using Fuzzy logic in MATLAB.
5) Study of Neural Networks and Perceptron Example.
6) Study of Radial Basis Function and Application
7) Study of Probabilistic Neural Networks and Application.
8) Study of GA tool in MATLAB.
9) Development of genetic algorithms for domain specific Engineering applications.
10) Development of different evolutionary algorithms for domain specific Engineering applications.
PROFESSIONAL ELECTIVES (PE-I):

WIRELESS COMMUNICATION SYSTEMS

3-1-0

MODULE-I

History of wireless communication: Concept of mobile and personal communication, wireless cellular platform, the design fundamentals of cellular networks, frequency reuse, spectrum capacity enhancement techniques, co-channel and adjacent channel interference, location management, handoff management; Concept of mobile IP for mobility management issues.

MODULE-II

Propagation Models for Wireless Networks: Two-ray ground reflection model, a micro-cell propagation model, a macro-cell propagation model, shadowing model, large scale path loss and shadowing, multi path effects in mobile communication, linear time variant channel model; Concept of coherent bandwidth, Coherent time, Doppler Shift - Effect of velocity of the mobile, models for multi path reception, mobile communication antennas.

MODULE-III

Multiple access techniques in wireless communications: frequency division multiple access technology (FDMA), time division multiple access (TDMA), space division multiple access (SDMA), code division multiple access (CDMA); spectral efficiency of different wireless access technologies, spectral efficiency in FDMA system, spectral efficiency in TDMA system, spectral efficiency for DS-CDMA system.

MODULE-IV

Second Generation Mobile Networks-GSM: Architecture and protocols, access technology, call set up procedure, 2.5 G networks; evolution to GPRS, concept of data communication on GPRS, session management and PDP Context, data transfer through GPRS network and routing.

ADDITIONAL MODULE (Terminal Examination-Internal)

Evolution of modern mobile wireless communication systems: Personal area networks (PAN), Public wide-area wireless networks, wireless Local Area Networks; Brief introduction to 3G – The universal mobile telecommunication system (UMTS) Basic idea of satellite mobile communication systems.
### 7th Semester

**Text Books**


**Reference Books**


7th Semester

DATABASE MANAGEMENT SYSTEM
3-1-0

MODULE-I
Introduction - Evolution of database systems, overview of database management systems.

MODULE-II
Relational Model - Structures of relational databases, integrity constraints; Logical database design - ER to relational, relational algebra, relational calculus, functional dependencies, multi-valued dependencies, normal forms, Decompositions into normalized relations.

MODULE-III
SQL – Simple queries, queries with more than one relation, sub queries, full relation operations, Database modifications, View definitions.

MODULE-IV
Issues in Physical Database Design – physical data storage, raid disk organization technique; file structures – sequential file organization, indices, b-trees, hash tables.

ADDITIONAL MODULE (Terminal Examination-Internal)
Details of Relational Algebra – Basic operators, extended operators, constraints.

Text Books


Reference Books

**ELECTRONIC DESIGN AUTOMATION**

**3-1-0**

**MODULE-I**

MOSFET small signal model, MOSFET parasitic capacitance value and modification in model. Scaling of MOS structure; SPICE level -1, level-2 and level 3 model; BSIM and CSIM models; Comparison between models. Layout generation, Design checking rules, Lamda, beta rule, routing: auto routing,

**MODULE-II**

Advance programming using VHDL. Component level programming. Library files, type\ declaration and usage, parameter types and overloading, types and type related issues, predefined and user-defined attributes, package declaration and usage.

**MODULE-III**

Introduction to CADENCE, Use of CADENCE, Basic modeling using CADENCE, Layout generation using CADENCE. Introduction to low power IC design using CAD tools,

**MODULE-IV**

Delta delay modeling, insertion and transport delay. Use of signal drivers. Multiple processes

**ADDITIONAL MODULE (Terminal Examination-Internal)**

Device floor planning basics, Case study of a low power OPAMP design and layout generation.

**Text book**

1) Electronics Design Automation: Synthesis, verification & Test (System on Silicon)- Laung-Terng Wang, Morgan Kaufmann,2009

2) Essential Electronics design Automation (EDA)- Mark D.Birnbaum, Prentice Hall,2004
7th Semester

DIGITAL IMAGE PROCESSING

MODULE-I
Fundamentals – Steps in digital image processing, sampling and quantization, relationship between pixels, imaging geometry


MODULE-II
Image Enhancement – Point processing, spatial filtering (smoothing and sharpening filters), enhancement in frequency domain.

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic filtering in the frequency domain, image smoothing and sharpening.

MODULE-III
Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function.

Color Image Processing: Color models, Color transformation.

MODULE-IV
Wavelets and Multi-resolution Processing: multiresolution expansions, wavelet transforms in one and two dimension.

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 of Text book 1)

ADDITIONAL MODULE (Terminal Examination-Internal)

Morphological Image Processing: Erosion and Dilation, opening and closing.

Text books
3) Digital Image Processing And Analysis, B. Chanda, Dutta D. Majumder, PHI

Reference Books
SATELLITE COMMUNICATION SYSTEMS

3-1-0

MODULE-I (12 Hours)

Introduction to satellite communication: Orbital mechanics and parameters look angle determination, Launches and Launch vehicle, Orbital effects in communication system performance. Attitude and orbit control system (AOCS), TT&C, Description of spacecraft System; Transponders,

Satellite Link Design: Basics of transmission theory, system noise temperature and G/T ratio, Uplink and Downlink design, design of satellite links for specified (C/N) performance.

MODULE-II (10 Hours)

Analog telephone and television transmission: Energy dispersal, digital transmission

Multiple Accesses: Multiplexing techniques for satellite links, Comprehensive study on FDMA, TDMA and CDMA; Spread Spectrum Transmission and Reception; Estimating Channel requirements, SPADE, Random access

MODULE-III (12 Hours)

5. Propagation on satellite: Earth paths and influence on link design; Quantifying attenuation and depolarization, hydrometric & non hydrometric effects, ionosphere effects, rain and ice effects.

Satellite Antennas: Types of antenna and relationships; Basic Antennas Theory – linear, rectangular & circular aperture; Gain, pointing loss,

MODULE-IV

Earth station Technology: Earth station design; Design of large antennas – Cassegrain antennas, optimizing gain of large antenna, antenna temperature, feed system for large cassegrain antennas,

Design of small earth station antennas: Front fed paraboloid reflector antennas, offset fed antennas, beam steering, Global Beam Antenna, equipment for earth station.

ADDITIONAL MODULE (Terminal Examination-Internal)

Equipment reliability and space qualification.

Application of Satellite communication: Network distribution and direct broad casting TV, fundamentals of mobile communication satellite
7th Semester

Text Books


Reference Books

1. Digital Communication with Satellite and Fiber Optic Application, HarlodKolimbins, PHI
2. Satellite Communication, Robert M. Gagliardi, CBS Publishers
3. Satellite Communication Systems, Richharia. BSP BOOKS PVT LTD.
4. Satellite Communication Engg., MichealKolawole, BSP BOOKS PVT LTD
7th Semester

ADAPTIVE SIGNAL PROCESSING
3-1-0

MODULE-I (10 Hours)

The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.

MODULE – II (14 Hours)
Theory of Adaptation with Stationary Signals: Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix.

Searching the Performance Surface: A simple gradient search algorithm, Stability and Rate of convergence, the learning curve.

MODULE-III (16 Hours)
Gradient Estimation and its effects on Adoption: The performance penalty, Variance of the gradient estimate, Misadjustment.

Adaptive Algorithms and Structures: The LMS Algorithm, Convergence, learning Curve, Performance analysis, Filtered X LMS algorithm,

MODULE-IV

ADDITIONAL MODULE (Terminal Examination-Internal)
Adaptive Control Systems using Filtered X LMS Algorithm, Adaptive Noise Cancellation using Adaptive filter

Text Books


Reference Books

ADVANCED CONTROL SYSTEMS
3-1-0

MODULE-I (15 Hours)

Discrete - Time Control Systems:
Digital Control Systems: Sample and Hold, Analog to digital conversion, Digital to analog conversion.
Z-Plane Analysis of Discrete Time Control Systems:
Impulse sampling & Data Hold, Reconstruction of Original signals from sampled signals: Sampling theorem, folding, aliasing.
Pulse Transfer function: Starred Laplace Transform of the signal involving Both ordinary and starred Laplace Transforms; General procedures for obtaining pulse Transfer functions, Pulse Transfer function of open loop and closed loop systems.

MODULE-II (15 Hours)

State Variable Analysis & Design:
Diagonalization: Eigen values and Eigen vectors, Generalized Eigen vectors.
MODULE -III (12 Hours)

**Solution of State Equations**: Properties of the State Transition Matrix, Computation of State Transition Matrix, Computation by Techniques Based on the Cayley-Hamilton Theorem, Sylvester’s Expansion theorem.

**Concepts of Controllability and Observability**: Controllability, Observability, Effect of Pole-zero Cancellation in Transfer Function.

**Pole Placement by State Feedback, Observer Systems. State Variables and Linear Discrete – Time Systems**: State Models from Linear Difference Equations/z-transfer Functions, Solution of State Equations (Discrete Case), An Efficient Method of Discretization and Solution, Linear Transformation of State Vector (Discrete-Time Case), Derivation of z-Transfer Function from Discrete-Time State Model.

MODULE-IV

Nonlinear Systems:

Introduction: Behaviour of Nonlinear Systems, Investigation of nonlinear systems.

Common Physical Nonlinearities: Saturation, Friction, Backlash, Relay, Multivariable Nonlinearity.

The Phase Plane Method:

Basic Concepts, Singular Points: Nodal Point, Saddle Point, Focus Point, Centre or Vortex Point

Stability of Non Linear Systems: Limit Cycles,


The Describing Function Method:

Basic Concepts: Derivation of Describing Functions: Dead-zone and Saturation, Relay with Dead-zone and Hysteresis, Backlash.

Stability Analysis by Describing Function Method: Relay with Dead Zone, Relay with Hysteresis, Stability Analysis by Gain-phase Plots.

ADDITIONAL MODULE (Terminal Examination-Internal)

Jump Resonance, Liapunov’s Stability Analysis:


Direct Method of Liapunov & the Linear System: Methods of constructing Liapunov functions for Nonlinear Systems.
Text Books


Reference books

1) Design of Feedback Control Systems, Stefani,
EMBEDDED SYSTEM DESIGN

MODULE – I            (8 Hours)
Embedded System: Understanding the Basic Concepts:


Characteristics and Quality Attributes of Embedded System.


MODULE – II            (8 Hours)
Design and Development of Embedded Product:


Embedded Firmware Design and Development: Embedded firmware Design Approaches, Embedded firmware Development Languages.

MODULE – III                    (8 Hours)
Real Time Operating System (RTOS) based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronisation, Device Drivers, How to choose an RTOS.

MODULE – IV           (8 Hours)
Design and Development of Embedded Systems:

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware & Firmware, Board Power up.

The Embedded System Development Environment: Integrated Development Environment (IDE), Types of files generated on cross-compilation, Disassembler/Decompiler, Simulators, Emulators & Debugging, Target Hardware Debugging.

Embedded Product Development Life Cycle (EDLC): Definition and Objectives of EDLC, Different Phases of EDLC, EDLC Approaches (Modelling the EDLC).
ADDITIONAL MODULE (Terminal Examination-Internal)  (8 Hours)

Major Application Areas of Embedded Systems.


**An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (μCOS-II)**

**RTOS:** VxWorks, MicroC/OS-II (μCOS-II); Boundary Scan;


**Text Book:**


**Reference Book:**

7) Embedded system design. Modeling synthesis and verification, Daniel Gajski. BSP BOOKS PVT LTD.
PROFESSIONAL ELECTIVES (PE-II)

WIRELESS SENSOR NETWORK

MODULE-I (8 Hours)

Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

MODULE-II (6 Hours)

MODULE-III (8 Hours)
Wireless Communications: Link quality, shadowing and fading effects

Medium-access and sleep scheduling: Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep-scheduled techniques, and Contention-free protocols.

MODULE-IV (6 Hours)
Routing: Metric-based approaches, Multi-path routing, Lifetime-maximizing energy-aware routing techniques, Geographic routing.

Sensor network Databases: Data-centric routing, Data-gathering with compression,

ADDITIONAL MODULE (Terminal Examination Internal) (8 Hours)
State space decomposition; Synchronization: Issues and Traditional approaches, Fine-grained clock synchronization, and Coarse-grained data synchronization; Querying; Data-centric storage and retrieval; the database perspective on sensor networks; Security: Privacy issues, Attacks and countermeasures.
Text Books


References Books


OPTICAL COMMUNICATION AND NETWORKING

**MODULE-I**

**(9 Hours)**

**Introduction:** Introduction, Ray theory transmission, Total internal reflection - Acceptance angle, Numerical aperture; Skew rays; Electromagnetic mode theory of optical propagation: EM waves, modes in Planar guide, phase and group velocity; Cylindrical fibers, i.e., SM fibers.

**MODULE-II**

**(9 Hours)**

Transmission characteristics of optical fibers: Attenuation – Material absorption losses in silica glass fibers, Linear and Non-linear Scattering losses, Fiber Bend losses; Mid-band and far band infrared transmission; Intra and inter Modal Dispersion – Over all Fiber Dispersion; Polarization: non-linear Phenomena; Optical fiber connectors, Fiber alignment and Joint Losses; Fiber Splices, Fiber connectors, Expanded Beam Connectors: Fiber Couplers.

**MODULE-III**

**(9 Hours)**

Sources and detectors: Optical sources: Light Emitting Diodes, LED structures, surface and edge emitters, mono and hetero structures: internal; quantum efficiency; Injection laser diode structures; comparison of LED and I LD Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties; Comparison of performance; Photo detector noise: Noise sources, Signal to Noise ratio, Detector response time.

**MODULE-IV**

**(9 Hours)**


**ADDITIONAL MODULE (Terminal Examination-Internal)**

**(9 Hours)**

Optical networks: Basic Networks, SONET / SDH, Broadcast and select WDM Networks; Wavelength Routed Networks; Nonlinear effects on Network performance, Performance of WDM + EDFA system, Solutions; Optical CDMA; Ultra High Capacity Networks.

**Text Books**


**Reference Books**

**SYSTEM DESIGN USING INTEGRATED CIRCUITS**

**3-1-0**

**MODULE- I**

(8 Hours)

**Linear IC- Operational amplifier:** Introduction to linear ICs, Operational amplifier IC741, Block diagram and characteristics, DC and AC performance; Open loop configurations, Feedback configurations, Inverting, non inverting and differential amplifier, Summer, Subtractor, Integrator, Differentiator, Zero crossing detector, Schmitt trigger, Window detector; Astable and monostable multivibrators; V-I and I-V converters; Filter and its types, Instrumentation amplifier, Precision rectifiers, Logarithmic and antilog amplifiers; multiplier; Op amp voltage regulator, IC linear voltage regulator (series 7800 and 7900 ICs).

**MODULE- II**

(8 Hours)

**Other LICs and Data Converters:** 555 timer, Block diagram and features, Astable multivibrator, applications, Square wave oscillator, Ramp generator, Triangular waveform generator and Voltage to frequency converter; Monostable multivibrator, applications, Frequency divider, PWM and PPM generators. XR2240 Programmable Timer/Counter, Block diagram and operation, applications, Free running oscillator and frequency synthesizer; PLL565, Principle, Building blocks, applications, Frequency multiplication, Frequency translation, AM and FM detection. Data converters, DAC characteristics, Binary weighted DAC, R-2R DAC, Monolithic DAC-08, ADC characteristics, Flash ADC, Successive approximation ADC, dual slope integrating type ADC, Monolithic ADC AD670, Variable Voltage Regulators (LM317).

**MODULE- III**

(8 Hours)

**Digital Integrated Circuits:** Digital IC characteristics, Digital IC families, RTL and DTL, HTL, I2L, TTL, ECL, MOS and CMOS logic circuits, Comparison of digital IC families.

**MODULE- IV**

(8 Hours)

**Design of sequential machines:** Analysis and design of synchronous sequential machines, Mealey and Moore machines, State table, State diagram, State reduction and assignments, Analysis and design of asynchronous sequential logic, Race conditions, Design problems from specifications, Hazards in combinational and sequential circuits.

**ADDITIONAL MODULE (Terminal Examination-Internal)**

(8 Hours)

**Processor and control unit design:** Registers, Register transfer logic, inter register transfer, bus transfer and memory transfer, Arithmetic logic and shift micro operations, Macro operations; Processor logic design, Processor organization, Bus organization, Processor unit employing a scratch pad memory, Accumulator, Design of ALU, Design of status register, Design of processor unit with control variables, Design of accumulator, Control logic design, Single flip flop/state method, Sequence register and decoder method, PLA control, Micro program control.
7th Semester

Text Books


Reference Books


CMOS BASED DESIGN

3-1-0

**MODULE-I**  
Introduction to MOS Device  
(8 Hours)  
MOS Transistor, MOS models; MOS Transistor under static conditions; threshold voltage; Resistive operation, saturation region; channel length modulation; body effect; DC transfer characteristics; Tristate inverters, velocity saturation; Hot carrier effect, drain current Vs voltage charts, sub threshold conduction; MOS structure capacitance; CMOS logic, fabrication and layout, stick diagrams.

**MODULE-II**  
CMOS Processing  
(8 Hours)  
CMOS technologies, wafer formation photolithography channel formation, isolation, gate oxide, gate source, drain formation, contacts and metallization; layout design rules, design rule checking.

**MODULE-III**  
Circuit Characterization & Performance Estimation  
(8 Hours)  
Delay estimation; transistor sizing; power dissipation; Sheet resistance, area capacitance, design margin, reliability; Scaling models, scaling factor for device parameters, Advantages and Limitations of scaling.

**MODULE-IV**  
Design of Combinational Logic  
(6 Hours)  
Static CMOS design, complementary CMOS, static properties, complementary CMOS design, Power consumption in CMOS logic gates, dynamic or glitching transitions, Design to reduce switching activity; Radioed logic, DC VSL, pass transistor logic.

**ADDITIONAL MODULE (Terminal Examination-Internal)**  
(6 Hours)  
Differential pass transistor logic; sizing of level restorer, sizing in pass transistor; Dynamic CMOS design; Domino logic, optimization of Domino logic; NPCMOS; Designing logic for reduced supply voltages.

**Reference Books**
MOBILE COMPUTING
3-1-0

MODULE – I
Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signaling; Global System for Mobile Communication (GSM) System.

Overview: GSM Architecture, Mobility management, Network signaling; General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard.

MODULE–II
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

MODULE–III
Global Mobile Satellite Systems; case studies of the IRIDIUM, ICO and GLOBALSTAR systems.

MODULE–IV
Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols; Server-side programming in Java, Pervasive web application architecture, Device independent example application.

ADDITIONAL MODULE (Terminal Examination-Internal)  (6 Hours)
Wideband Code Division Multiple Access (W-CDMA) and CDMA 2000; Mobile IP.

Text Books

Reference Books
BIOMEDICAL SIGNAL PROCESSING
3-1-0

MODULE-I
Introduction to Biomedical Signals: Tasks in Biomedical Signal Processing, Computer Aided Diagnosis, Examples of Biomedical signals: ECG, EEG, EMG etc., Review of linear systems, Fourier Transform and Time Frequency Analysis (Wavelet) of biomedical signals, Processing of Random & Stochastic signals, spectral estimation.

MODULE-II
Cardio-logical Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition, Heart rate variability analysis.

MODULE-III

MODULE-IV
Neurological Signal Processing: Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering.

ADDITIONAL MODULE (Terminal Examination-Internal) (6 Hours)
Properties and effects of noise in biomedical instruments; Filtering in biomedical instruments; Least squares and polynomial modeling;

Reference Books
MATHMATICS FOR COMMUNICATION ENGINEERS

3-1-0

MODULE–I


Vector Spaces and Linear Algebra: Metric Spaces, Vector Spaces, Norms and Normed Vector Spaces, Inner Products and Inner Product Spaces, Induced Norms, The Cauchy-Schwarz Inequality, Orthogonal Subspaces, Projections and Orthogonal Projections, Projection Theorem Orthogonalization of Vectors. [Moon: 2.1 to 2.6, 2.10, 2.13, 2.14, and 2.15].

MODULE – II

Representation and Approximation in Vector Spaces: The Approximation Problem in Hilbert Space, The Orthogonality Principle, Matrix Representation of Least-Squares Problems, Linear Regression, Least-Squares Filtering, Minimum Mean-Square Estimation, Minimum Mean-Squared Error (MMSE) Filtering, Comparison of Least Squares and Minimum Mean Squares. [Moon: 3.1, 3.2, 3.4, 3.8 to 3.12]

Some Important Matrix Factorization: The LU Factorization, The Cholesky Factorization, Unitary Matrices and the QR Factorization. [Moon: 5.1 to 5.3]

Eigenvalues and Eigenvectors: Eigen Values and Linear Systems, Linear Dependence of Eigenvectors, Diagonalization of a Matrix. [Moon: 6.1 to 6.3]

MODULE–III

The Singular Value Decomposition: Theory of the SVD, Matrix Structure from the SVD, Pseudo-inverses and the SVD, Rank-Reducing Approximations: Effective Rank, System Identification Using the SVD. [Moon: 7.1 to 7.3 and 7.5]


MODULE–IV


ADDITIONAL MODULE (Terminal Examination-Internal) (6 Hours)

Text Books


Reference Books


OPEN ELECTIVE

OPERATION RESEARCH

3-1-0

MODULE-I

MODULE-II
Transportation Problem: Formulation of transportation model, Optimality Methods, Unbalanced transportation problem, Basic feasible solution, Northwest corner rule, least cost method, Vogel’s approximation method, Applications of Transportation problems, Assignment Problem, Formulation, unbalanced assignment problem, Traveling salesman problem, Optimality test, the stepping stone method, MODI method.

MODULE-III
Sequencing Models: Johnsons algorithm, Processing n Jobs through 2 Machines, Processing n Jobs through 3 Machines, Processing 2 Jobs through m machines, Processing n Jobs through m Machines, Graphical solutions priority rules.

MODULE-IV
Dynamic programming: Characteristics of dynamic programming, Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.

ADDITIONAL MODULE (Terminal Examination-Internal)
Games Theory: Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Text Books

Reference Books
2) Operations Research, S. D. Sharma ,Kedarnath Ramnath & Co 2002
4) Operation Research, P K Gupta and D S Hira, S. Chand & co, 2007
INTERNET TECHNOLOGY AND APPLICATIONS (3-1-0)

MODULE – I
The Internet and WWW:
Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites

HTML:
Planning for designing Web pages, Model and structure for a Website, Developing Websites, Basic HTML using images links, Lists, Tables and Forms, Frames for designing a good interactive website

MODULE – II
JAVA Script:
Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements, Try…. Catch Statement, Throw Statement, Objects of Java script: Date object, array object, Boolean object, math object

MODULE – III
DOM:
HTML DOM, inner HTML, Dynamic HTML (DHTML), DHTML form, XML DOM

CGI/PERL:
Introduction to CGI, Testing & Debugging Perl CGI Script, Using Scalar variables and operators in Perl

MODULE – IV
Java Applet:
Introduction to Java, Writing Java Applets, Life cycle of applet

ADDITIONAL MODULE (Terminal Examination-Internal)
CSS:
External Style Sheets, Internal Style Sheets, Inline Style, The class selector, div & span tag

Textbooks
1) Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning

Reference Books
1) Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech
2) Programming the World Wide Web, Robert W Sebesta, Pearson
3) Web Technologies, Uttam K Roy, Oxford
4) Web Technology: A developer perspective, Gopalan & Akilanadeswari, PHI
INDUSTRIAL AUTOMATION AND CONTROL
3-1-0

MODULE-I (12 Hours)
Process Control: Introduction: Process Definition, Feedback Control, PID Control, Multivariable Control. (Chapter 1 of Text Book 1)

PID Controller Tuning: Introduction, Zeigler-Nichols Tuning Method (Based on Ultimate Gain and Period, and Process Reaction Curve), Digital PID Controllers. (Chapter 13 of Text Book 2)

MODULE-II (15 Hours)
Special Control Structures: Cascade Control, Feed forward Control, Feed forward-Feedback Control Configuration, Ratio Control, Selective Control, Adaptive Control, Adaptive Control Configuration. (Chapter 10 and 11 of Text book 3)


MODULE-III (10 Hours)
Motor Actuators and Control Valves. (Chapter 8 of Text Book 1)

IndustriAl Automation: Programmable Logic Controllers: Introduction, Principles of operation, Architecture, Programming (Programming Languages, Ladder Diagram, Boolean Mnemonics)

MODULE - IV
Distributed Control: Distributed vs. Centralized, Advantages, Functional Requirements, System Architecture.

Real-time Programming: Multi-tasking, Task Management, Inter-task Communication, Real-time Operating System. (Chapter 9 of Text Book 1)

ADDITIONAL MODULE (Terminal Examination-Internal)
Distributed Control Systems (DCS), Communication options in DCS.

Text Books

Reference Books
3) C. Johnson, "Process Control Instrumentation Technology", PHI, New Delhi
7th Semester

COMPILER DESIGN

3-1-0

MODULE-I
The structure of a compiler, Lexical Analyzer: regular expression, finite automata, NFA, DFA, minimizing the number of states of a DFA, implementation issues

MODULE-II
Introduction to LEX. Syntactic specification of a programming language, context-free grammar, derivation and parse trees, ambiguity. Basic Parsing Techniques: shift reduce parsing, operator-precedence parsing. Top Down parsing, LL (1) parsers.

MODULE-III
Bottom up Parsing, LR parsers, LR (0) items, construction of SLR parsing table. Introduction canonical LR parsing, LALR parsing table. Use of ambiguous grammars for LR parser implementation

MODULE-IV
Introduction to YACC. Syntax Directed Translation. Intermediate code, postfix notation, three address codes – quadruples and triples. Translation of assignment statement, Boolean expressions, control structures, arrays. Run-time Storage Administration and symbol table management

ADDITIONAL MODULE (Terminal Examination-Internal)
Data-flow analysis, Code Optimizations.

Text Books
1) Principle of Compiler Design- by Alfred Aho and Jeffrey Ullmen, Addison-Wesley
2) Compiler Design-by Muneeeswaran, Oxford University Press.

Reference book
1) Principles of compiler design by Raghavan, TMH
MULTIMEDIA SYSTEMS

3-1-0

MODULE- I
Multimedia components:

Introduction - Multimedia skills - Multimedia components and their characteristics Text, sound, images, graphics, animation, video, hardware

MODULE-II
Audio and video compression:


MODULE-III
Text and image compression:


MODULE-IV
VoIP technology:

Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods- VOIP applicability

ADDITIONAL MODULE (Terminal Examination-Internal)
Multimedia networking:

Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-secluding and policing Mechanisms-integrated services-differentiated Services-RSVP
Text books

Reference Books
1. Marcus goncalves “Voice over IP Networks”, McGraw hill
2. KR. Rao, Z S Bojkovic, D A Milovanovic, “Multimedia
ENGINEERING ACOUSTICS

MODULE-I

Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – method of images.

MODULE-II

Absorption and attenuation of sound: Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

MODULE-III
Pipes resonators and filters: Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass.


MODULE-IV
Architectural acoustics: Sound in endosure – A simple model for the growth of sound in a room – reverberation time -Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design.

Environmental Acoustics: Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

ADDITIONAL MODULE (Terminal Examination-Internal)

Text book

Reference Book
3) L.Beranek , “Acoustics” - Tata McGraw-Hill
REMOTE SENSING  
3-1-0

MODULE I

MODULE-II

MODULE-III

MODULE-IV

ADDITIONAL MODULE (Terminal Examination-Internal)
Text books


Reference Books


2) Kang-Tsung Chang, "Introduction to Geographic Information Systems", TMH, 2002


ADVANCE LAB-II

NETWORKING LAB
0-0-4

List of Experiments:

1) Study and measurement of attenuation and loss in optical fiber.
2) Study and measurement of bending loss in optical fiber.
3) Study and measurement of numerical aperture of optical fiber.
4) Measurement of optical power using optical power meter.
5) To Study the transmission of TDM signal through optical fiber.
6) To determine the bit rate of the optical fiber link.
7) Study of various multiplexing techniques.
8) Investigate the Power versus current curves and spectrum of different Lasers and observe the effects of different cavity characteristics.
9) Investigate the characteristics of PIN and Avalanche Photodiodes and understand the usage of the Light wave Analyzer component.
10) Investigate the effect of loss on optical system performance and characterize the system with the power budget equation. Use Opti System to optimize the fiber length of a communication system.
11) Determine the optical modes that exist for multimode step index fibers and investigate their performance on optical systems.
12) Characterize analytically and through simulation the effects of dispersion on optical systems.
13) Study the characteristics of EDFAs alone and in a system. Reanalyze the importance of receiver noise and the effect of amplification on the quality of an optical system.
14) Characterize analytically and through simulation the effects of nonlinearity on optical systems.
15) Investigate the method for measuring the BER accurately and the distortions present in coherent modulators.
16) Build a coherent receiver based on the 90-degree optical hybrid and further investigate the QAM format.
17) To determine the BER of wireless system using M-ARY (BPSK, QPSK, 8PSK, 16PSK) technique.
18) To determine the BER of wireless system using QAM technique.
HONOURS SPECIALIZATION:

TELECOMMUNICATION NETWORKS AND OPTIMIZATIONS

4-0-0

MODULE-I

MODULE-II

MODULE-III
Advanced routing – Steiner trees and multicast – centralized routing (PCE), software defined network – distributed routing on ad-hoc networks, power aware MANET - reliability and route optimization.

MODULE-IV
Access Networks – Data link layer and media access control technologies – wireless and optical access – resource scheduling and optimization – Bipartite graph and stable matching algorithms – case studies (10);

ADDITIONAL MODULE (Terminal Examination-Internal)
Access core interface – case studies (5).

Text Books
1. Network Optimization by V. K. Balakrishnan
2. Linear Network Optimization: Algorithms and Codes by D. Bertsekas
3. Mathematical Aspects of Network Routing Optimization by C. A. S. Oliveira, P. M. Pardalos

Reference Books
1. Network Flows: Theory, Algorithm and Application by R. K. Ahuja, C. L. Magnanti, James B.
2. Optimization Algorithm for Networks and Graphs – vol. 1 by J. R. Evans, E. Mineka
3. Integer Programming and Network Models – H. A. Eiselt, C. L. Sandblom
MINOR SPECIALIZATION:

VLSI DESIGN

4-0-0

MODULE – I (08 Hrs)


MODULE – II (14 Hrs)
MOS Transistor: The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitance. (Chapter 1 to 3 of Text Book 1 and for Stick Diagram Text Book 2)

MOS Inverters – Static Characteristics: Introduction, Resistive-Load Inverters, Inverters with n-Type MOSFET Load, CMOS Inverter.


MODULE – III (18 Hrs)
Combinational MOS Logic Circuits: Introduction, MOS Logic Circuits with Depletion nMOS Loads, CMOS Logic Circuits, Complex Logic Circuits, CMOS Transmission Gates (Pass Gates). (Chapter 5 to 7 of Text Book 1)


MODULE - IV

Semiconductor Memories: Introduction, Dynamic Random Access Memory (DRAM), Static Random Access Memory (SRAM), Non-volatile Memory, Flash Memory.

ADDITIONAL MODULE (Terminal Examination-Internal)
Design for Testability: Introduction, Fault Types and Models, Ad Hoc Testable Design Techniques, Scan-Based Techniques, Built-In Self-Test (BIST) Techniques, Current Monitoring I_{DQ} Test.
Text Books


Reference Books


