CURRICULUM
FOR
MASTERS OF TECHNOLOGY IN
“ELECTRONICS & COMMUNICATION ENGINEERING”

SRI SAI UNIVERSITY PALAMPUR
(H.P.) INDIA

JULY 2017
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Foreword

Sri Sai University Palampur Himachal Pradesh has been established with a purpose of empowering people. The Vision and Mission of the university are:-

- **Vision**
  To provide quality education for developing all round personality of students through curricular, co-curricular and extracurricular activities to meet ever growing manpower requirements of industry and other sectors of economy as per national priorities.

- **Mission**
  a. To establish institutions for imparting quality education.
  b. To promote creative and innovative research and development.
  c. To ensure quality education by periodic review of curricula through industry-institute interaction.
  d. To make efforts for updating knowledge of faculty/staff through quality improvement programmes (Training and retraining)
  e. To promote employability through development of requisite competency skills.
  f. To work for cause of weaker sections, physically challenged and women welfare through education and enlightenment.
  g. To make life healthier, better and modern by inculcating in students Indian values/heritage.
  h. To bring about out a holistic development of society by educating individuals.

At present programmes in Civil Engineering, Mechanical Engineering, Electronics & Communication Engineering and Computer Science Engineering are being run here to develop manpower having global perspective, faith in our Indian values and culture and competencies desired for profession. In order to keep curriculum relevant and up to date, the University created a position of ‘Director Curriculum Development’ supported by Board of Studies of different discipline. The objective of this is to make teachers and students to become active partners in design of curriculum and instruction.

Director, Curriculum Development has involved Vice Chancellor, Executive Director and senior faculty members of SSU Palampur and Engineering & Technology Colleges at Pathankot and Amritsar in the revision of curriculum. This has created awareness and importance of systematic curriculum design seminar of various programmes and role expected from all the stakeholders.

This curriculum has been designed by taking into account incorporating the existing programmes as being run at SSU Palampur and referring to courses of Punjab Technical University, Jalandhar; various IITs; VIT Vellore; Jamia Milia Islamabad New Delhi; PEC University of technology, Chandigarh and innovations undertaken by NITTTR Chandigarh in curriculum design. Hope this Curriculum will bring desired results.

Dr Naresh Nagpal
Executive Director
Sri Sai Group of Institutes
Corporate office, Chandigarh.
PREFACE

Curriculum is a plan comprising of learning experiences; to be given to students for developing competencies as desired by the ‘world of work’ in their professional life. Curriculum for SSU programmes has been designed with active involvement of the faculty and other stakeholders. This process of designing the curriculum was a unique learning experience for all those involved in the process and understands the meaning and importance of scientific and systematic design of curriculum. A group of teachers provided feedback to the coordinator to update Curriculum. This group also scanned employment opportunities and job skills expected from an engineering graduate for inclusion in the curriculum, so as to make it relevant. This results in developing in the faculty a sense of ownership due to their involvement in the process.

The steps followed in the design of Curriculum of the degree programme were:

I. Discussions of Director, Curriculum Development with Chancellor, Vice Chancellor and Executive Director regarding their views on their Vision and Mission of the University vis a vis constraints of programme as well as expectations of Director, Curriculum Development.

II. Orientation programme for senior faculty of SSU to educate them about a rational approach to Curriculum design and to know about their experience of implementing the existing curriculum.

III. Interaction with the faculty from various Institutions to know their view point on their specific discipline, areas of employment, profile of an engineer and curriculum etc.

IV. Analyze the guidelines given by AICTE. ABET and NBA for programme accreditation so as to adhere to the norms and standards for Curriculum of Engineering Degree programmes.

V. Analysis of syllabus and test questions of engineering services examination to ensure that designed curriculum includes most of the broad areas and their levels of expectations from fresh graduates.

VI. SSU faculty prepared Horizontal and Vertical organization of subjects of curriculum and learnt about taking decision on various components of Curriculum and their articulation and importance in terms of time. They also understood the logical and chronological placement of subjects in the whole Curriculum.

VII. A workshop was organized at SSCET Pathankot for having understanding of the common features of the programmes; present syllabus being followed at SSU, difference between PTU Curriculum and SSU curriculum and innovation possible in implementation of curriculum.

VIII. Feedback was collected from coordinators of SSU programmes on the aspects given in VII so as to incorporate these in Curriculum document.

IX. Obtain opinion of experts from industry and academic on the proposed curriculum for degree programme in different discipline of Engineering.

X. The curriculum documents were subsequently validated and finalized in consultation with SSU Faculty.
Curriculum provides requisite experiences to students through formal, no formal and informal activities towards development of occupational, personal, social and continuing learning skills for making students employable. Focus of teachers and students is all the time to active the objective and outcome of the programme stated in the document. Students are made responsible for their learning and teachers become facilitators in this process.

During the design of the curriculum, the constraints of resources of the system in which this curriculum has to be implemented have been considered. It is hoped that with the support of enlightened administration and motivated faculty, innovative methodology will be adopted in teaching-learning process for providing desired learning experiences to the students as stated in curriculum documents.
1. **SALIENT FEATURES OF THE PROGRAMME**

1. Name of the programme : M. Tech in Electronics & Communication Engineering  
2. Duration of the programme: : 2years  
3. Entry Qualification : B.Tech/BE in Electronics and Communication  
4. Pattern of Programme : Semester system (4 Semesters)  
5. Duration of the Semester : 16 weeks  
6. Total hours per week: : 29 to 34 hours  
7. Ecological and Environmental : Second Semester (2-3) days  
   Awareness Camp and follow up  
8. Entrepreneurship Development : Fifth Semester (2-3) days  
   Camp and follow up  
9. Student centred activity : *library study/ independent study  
   S.C.A will include for searching and organization Information for use.
   - Library study
   - Market survey
   - Information search (industry/ in trust)
   - Seminar
   - Expert lectures
   - Camp for ecology & Environmental awareness, entrepreneurship development and personality development.
2. JOB OPPORTUNITY FOR M. TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING

- SCOPE FOR EMPLOYMENT

Industries involving wireless communication and signal processing, micro and nano electronics, lasers and optics, electronics devices, telecommunications, nanotechnology, robotics information systems, power systems, computer software-hardware integration, control systems and other advanced technologies.

Placement in leading core communication companies like BSNL, MTNL, Reliance communication, Tata telecom, Vodafone, Bharti telecom, Airtel, Nokia, CISCO, IBM, Intel, Agilent, Alcatel, AT&T, Ericsson, Honeywell, Bosch, National Instruments, Texas Instruments, HCL, and others.

Employment in Government sector such as Railway, Defence, information and Broadcasting sector, space Research. A large number of employment opportunities in education sector are also possible.

3. OUTCOME OF THE PROGRAMME

The Post Graduates of the ECE program:

- Will have a solid foundation in Electronics and communication engineering.
- Will have the analytical and practical skills to solve engineering problems along with competencies to apply knowledge in Mathematics and Science.
- Will have professional and communication skills to function as leaders and members of multi-disciplinary teams in engineering and other industries.
- Will have the capacity and motivation to function as ethically responsible professionals.
- Will be equipped to undertake lifelong learning.
- Will be prepared to ensure leadership role in addressing some of the technical issues of society.
## 4. STUDY AND EVALUATION SCHEME (FIRST TO FOURTH SEMESTER)

### FIRST SEMESTER

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Lecture Hours</th>
<th>Tutorial Hours</th>
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**Elective I**

1. Optical Communication OR Digital Speech & Image Processing
   - EC-514
   - EC-515

2. VHDL OR Nano Electronics
   - EC-516
   - EC-517
## THIRD SEMESTER

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**Elective II**
1. Wireless Sensor Networks
   OR
   Advanced Microprocessor & Embedded System
2. Mixed Signal Design

**Elective III**
1. Satellite Communication
2. Low Power VLSI Design
   OR
   MEMS and Sensor Design

**FOURTH SEMESTER**

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EC-501 Information Theory and Coding

Unit1: Basic Concepts of Information Theory: A measure of Uncertainty, Binary Sources, Measure of Information for two-dimensional discrete finite probability Scheme, Noise characteristics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity, Capacity of channel with symmetric noise structure BSC and BEC.


Unit3: 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, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes.

Unit4: BCH Codes: Description of codes, Decoding of BCH codes, Convolution Codes: Encoding of convolution codes, structural properties of Convolution codes, distance properties of Conventional codes, Distance Properties of convolution codes, Maximum likelihood decoding of convolution codes. Automatic Repeat Request Strategies: Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

Books:
1. F.M Reza: Information Theory, Mc Graw Hill
2. ShuLin & J Costeib: Error Control Coding, PHI


Unit 4. **Qualitative and Quantitative Research**: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.

Unit 5. **Measurement**: Concept of measurement – what is measured? Problems in measurement in research – Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio.


Unit 7. **Data Analysis**: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.


**Books:**

2. *Business Research Methods* – Alan Bryman & Emma Bell, Oxford University Press.
Unit1: Review of MOS technology:
Basic MOS transistors, enhancement and depletion model transistors, N-MOS and C-MOS processor, thermal aspects of processing, and production of masks.

Unit2: Electrical properties of MOS circuit:
Parameters of MOS transistors pass transistor, N-MOS inverter, pull-up to pull down ratio for an N-MOS inverter, C-MOS inverters, MOS transistor circuit model, latch up on C-MOS circuits.

Unit3: Design processes:
MOS layers, stick diagram, design rules, AWA OX C-MOS process description, double metal single poly silicon C-MOS process.

Unit4: Basic circuit concepts:
Sheets resistance, area capacitance delay unit, inverter delay, super buffers, propagation delays.

Unit5: Subsystem design & layout:
Architectural issues, switch logic, gate logic, examples of combinational logic, clocked Sequential circuits and other system consideration.

Unit6: Scaling of MOS circuits:
Scaling factor, limitations, scaling of wires and inter connections

Books:
Unit 1. Fourier Transform:
Definition of fourier transform, Fourier integral theorem, Fourier sine and cosine integral, Complex form of fourier integrals, Fourier transforms, Inverse fourier transform, Properties, Modulation theorem, Convolution theorem for fourier transforms, Parseval’s identity, Fourier transforms of derivative of functions, Relation between fourier and laplace transform.

Unit 2. Z – Transform:

Unit 3. Matrices and Linear System of Equations:
Solution of linear simultaneous equations by gaussian elimination, Crout’s method, Iterative methods: Jacobins method, Gauss- seidal method, Determination of eigen values by iteration.

Unit 4. Conformal Mapping:
Mapping, Conformal mapping, Bi-linear transformations, Cross ratio, Fixed point of Bilinear transformation, Some special transformation.

Unit 5. Calculus of Variations:
Euler-lagrange’s differential equation and application, The Brachistochrone problems, Isoperimetric problem, Hamilton’s principle and lagrange’s equation.

Books:
6. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
Unit1: REPRESENTATION OF BANDPASS SIGNAL AND SYSTEM:
Response of a band pass system to band pass signal, Representation of a band pass stationary stochastic processes, Representation of digitally modulated signals.

Unit2: MODULATION AND DEMODULATION FOR THE ADDITIVE GAUSSIAN NOISE CHANNEL:
Representation of signal waveforms and channel characteristics optimum demodulation for completely known signal in additive Gaussian Noise, Binary signaling in an AWGN Channel. Mary orthogonal Signaling in an AWGN Channel, Multiphase Signaling waveforms, combined multiple phase and multiple amplitude waveforms, Carrier recovery for coherent demodulation.

Unit3: DETECTION:
Optimum demodulation for signals with random phase in additive Gaussian Noise, Non-coherent Detection of binary signal in an AWGN channel, Non Coherent detection of M-ary orthogonal signal in an AWGN channel.

Unit4: DIGITAL SIGNALLING OVER A CHANNEL WITH INTERSYMBOL, INTERFERENCE AND ADDITIVE GAUSSIAN NOISE:
Signal design for band limited channels, optimum demodulation for ISI and additive white Gaussian noise linear equalization Feedback equalization.

Books:
At least ten experiments are to be performed related to the subjects taught in 1st semester using MATLAB.
Unit 1: DISCRETE – TIME DESCRIPTION OF SIGNALS & SYSTEMS:
Discrete-time sequences, response sequence, time invariant systems, stability and causality criterion for discrete-time system, linear constant coefficient difference equation, properties of real valued sequences, convolution, correlation.

Unit 2: THE Z-TRANSFORM:

Unit 3: THE DISCRETE FOURIER TRANSFORM (DFT):
Definition, its properties, DFT, IDFT pair, circular convolution, Computations for evaluating the DFT, FFT algorithm, Analytic derivation of the “decimation-in – time FFT algorithm”, Some general observation on the FFT.

Unit 4: INFINITE IMPULSE RESPONSE (IIR) FILTER DESIGN TECHNIQUES:
Introduction, Analog filter system function & frequency response, Analog low pass filter design techniques for Butterworth, Chebyshev Type-I and Type-II filters, Impulse invariance and Bilinear Transformation methods to convert Analog filters into Digital Filters. Transformation for converting low pass filters into other types. FINITE IMPULSE RESPONSE (FIR) FILTER DESIGN TECHNIQUES: Introduction, Designing, FIR filters by DFT method and frequency sampling method. Study of windows (Rectangular, Triangular, Hamming and Kaiser). Designing FIR filters with the windowing methods. DIGITAL FILTER STRUCTURE: The direct form I & II structures, Cascade & Parallel combination of IInd order sections.

Books:
EC508 WIRELESS AND MOBILE COMMUNICATION

Unit 1: MOBILE RADIO SYSTEMS: Introduction to mobile radio system, Paging systems, cordless telephone system, Cellular telephone systems—Cellular concept, frequency reuse, channel assignment strategies, interference and system capacity, trucking and grade of service, cell splitting, sectoring, microcell zone concept, HO Strategies.

Unit 2: MOBILE RADIO PROPAGATION: Mechanism, free space path loss, long distance path loss models, Okumura model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake’s channel model, Multipath characteristics of radio waves, signal fading, time dispersion, Doppeler spread, coherence time LCR, fading statistics, diversity techniques.

Unit 3: SPREAD SPECTRUM COMMUNICATION: Introduction to spread spectrum communication, multiple access techniques used in mobile wireless communication: FDMA/TDMA/CDMA, Cellular CDMA, packet radio protocols, CDMA, reservation protocols, capacity of cellular CDMA, soft HO.

Unit 4: WIRELESS SYSTEMS: Wireless systems and standards—GSM standards, signalling and call control, mobility management, location tracing, wireless data networking, packet error mode line on fading channels, Performance analysis of link and transport layer protocols over wireless protocols over wireless channels, mobile data networking (Mobile IP), wireless data services, IS-95, GPRS.

Books:
EC509 DATA AND COMPUTER COMMUNICATION NETWORKS

Unit1: Introduction:
A Communication model, Data Communications, Data Communication Networking, Need for Protocol Architecture, A Simple Protocol Architecture, OSI Model, the TCP/IP Protocol Architecture.

Unit2: Data Communications:

Unit3: Digital Data Communication Techniques:

Unit4: WAN and LAN:

Books:
3. Data Communication by FOROUZAN TMCG & NETWORKING.
EC510 DIGITAL VLSI DESIGN

Unit 1: Introduction:
Basic principle of MOSFETs, Introduction to large signal MOS models (long channel) for digital design.

Unit 2: MOS Inverters Static and Dynamic characteristics:
Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, transfer characteristics, logic threshold, Noise margins, and Dynamic behavior, transition time, Propagation Delay, Power Consumption.

Unit 3: MOS Circuit Layout & Simulation:
Layout design rules, MOS device layout: Transistor layout, Inverter layout, CMOS digital circuits layout & simulation, Circuit Compaction; Circuit extraction and post-layout simulation.

Unit 4: Combinational MOS Logic Design Static MOS design:
Complementary MOS, Ratioed logic, Pass Transistor logic, Complex logic circuits, DSL, DCVSL, Transmission gate logic.

Unit 5: Dynamic MOS design:
Dynamic logic families and performances.

Unit 6: Memory Design:
ROM & RAM cells design

Unit 7: Sequential MOS Logic Design:
Static latches, Flip flops & Registers, Dynamic Latches & Registers, CMOS Schmitt trigger, Monostable sequential Circuits, Astable Circuits. Adders, Multiplier Circuits.

Unit 8: VLSI Interconnects:
Interconnect delays, Cross Talks. Introduction to low power design, Input and Output Interface circuits.

Unit 9: BiCMOS Logic Circuits:
Introduction, Basic BiCMOS Circuit behavior, Switching Delay in BiCMOS Logic circuits.

Books:
At least ten experiments are to be performed related to the subjects taught in 2nd semester.
Unit1: Introduction:
Advantage of optical fiber communication, Elements of fiber communication link, Ray theory and electromagnetic mode theory for optical propagation, step index and graded index fiber numerical aperture. Optical Filters: Attenuation, Absorption, Linear and non-linear scattering losses, Dispersion, overall fiber dispersion, polarization, fiber bending losses, multimode step index and graded index fibers, single mode fiber, plastic clad and all plastic fibers, optical fibers cables, Doped fiber amplifier Dispersion shifted and dispersion flattered fibers, practical fiber profiles.

Unit2: Optical Sources:
Basic concepts; LED for optical communication, Burrus type double hetro structure, Surface emitting LED’s, Shape geometry, Edge emitting LED’s, LED to fiber launch system semiconductor lasers theory, modulation and characteristics, Fabry-Perot lasers quantum well and distributed feedback lasers. Photo Detectors: P-I-N Photo diodes: Theory and their characteristics, Avalanche Photo detectors, theory and their bandwidth Noise in APD.

Unit3: Optical Fiber Communication Systems:
Optical transmitter circuit; LED and laser drive of optical receiver circuit, structure, preamplifier, AGC equalization, optical power budge loading, Analog systems; analog modulation, Direct modulation, Sub carrier mode Distribution system, optical TDM sub carrier multiplexing, WDM.

Unit4: Coherent Systems:
Coherent receivers, homodyne and heterodyne detection, noise in receiver, polarization control, Homodyne receiver, reusability and laser synchronous demodulation, phase diversity receiver.

Books:
Unit1: Introduction:
Review of Filter design. Linear phase FIR filters. Methods of FIR filter design. Methods of IIR filter design. Applications of FIR & IIR filter in speech, image, seismic, medical and other areas.

Unit2: Speech Processing:
Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter. Speech signal processing-the phasor mode, Fourier transfer, DFT, FFT. The hardware use of FIR & IIR filters. Software, Elements of speech Synthesis-speech Recognition-speech in the computer-human interface.

Unit3: Image Processing:
Characterization of images as two-dimensional discrete fields, unitary transforms—DFT. Hadamard, slant and cosine transforms, compression schemes-Karhunen Loeve compression predictive coding schemes. Image enhancement-gray scale modification, edge enhancement, restoration-Wiener filtering, constrained deconvolution, recursive filtering. Segmentation, edge detection, thresholding, textural properties, geometry and shape description.

Books:
1. Digital Signal Processing - by Proakis & Manolakis
2. Speech and Audio Processing for multimedia PC’s - by Iain Murray
Unit1. Introduction to Hierarchical and Structured Design: Role of CAD Tools in the VLSI design process, CAD Algorithms for switch level and circuits simulation, Techniques and algorithms for symbolic layout, Algorithms for physical design – Placement and routing Algorithms, Compaction, Circuit extraction and Testing.


Unit3. Description and Design of Sequential Circuits: Standard combinational modules, Design of a Serial adder with accumulator, State graph for control network, Design of a binary multiplier, Multiplication of a signed binary number, Design of a binary divider.


Unit5. Data Subsystems: Storage modules, Functional modules, Data paths, Control subsystems, Micro programmed controller, Structure of a micro programmed controller, Micro instruction format, Micro instruction sequencing, Micro instruction Timing, Basic component of a micro system, Memory subsystem.

Unit6. I/O Subsystem: Processors, Operation of the computer and cycle time. Binary decoder, Binary encoder, Multiplexers and demultiplexers, Floating Point arithmetic-representation of floating point number, Floating point multiplication, Adders, Multipliers.

Unit7. PLA based synthesis: Multilevel logic synthesis, Logic optimization, Logic simulation, Compiled and event simulators, Relative advantages and disadvantages, Layout Algorithms, Circuit partitioning, Placement and routing algorithms, Automatic test program generation, Combinational testing, DAAlgorithm and PODEM algorithm, Scan-based testing of sequential circuits, Testability measures for circuits.

Books:
Unit 1. Introduction of Nano-electronics: The “Top-Down” Approach; The “Bottom-Up” Approach; Why Nano-electronics; Nanotechnology Potential; MOS Scaling theory-Issues in scaling MOS transistors; Short channel effects; Requirements for non-classical MOS transistor; Metal gate transistor-Motivation, requirements, Integration Issues; High-k gate based MOSFET, Motivation, requirements, integration issues of high-k.

Unit 2. Quantum Mechanics of Electrons: General postulates of quantum mechanics; Time-independent Schrodinger’s equation-boundary conditions on the Wave function; Analogies between quantum mechanics and classical electromagnetic; probabilistic current density; Multiple particle systems; Spin and angular Momentum.

Unit 3. Free and Confined Electrons: Free Electron gas theory of metals; Electrons confined to a bounded region of space and quantum numbers; Partially confined electrons- finite potential wells; Quantum wells; Quantum wires; Quantum dots.

Unit 4. Tunnel Junctions and Applications of Tunneling: Tunneling through a potential barrier; Potential energy profiles for material interfaces; Applications of tunneling; Coulomb blockade, Single-Electron Transistor (SET).

Unit 5. Germanium Nano MOSFETs: Strain, Quantization; Advantages of germanium over silicon; PMOS versus NMOS; Compound semiconductors - material properties; MESFETs; Compound semiconductors MOSFETs in the context of channel quantization and strain; Heterostructure MOSFETs exploiting novel materials, strain, quantization.

Unit 6. Non-Conventional MOSFET Structures: SOI-PDSOI and FDSOI; Ultrathin body SOI-double gate transistors, integration issues; Vertical transistors – FinFET and Surround gate FET; Carbon Nano-tube Transistors (CNT); Semiconductor Nano-wire FETs and SETs; Molecular SETs and Molecular Electronics.

Books:
2. Fundamental of Nanoelectronics, George W. Hanson Pearson Education.
3. Silicon VLSI Technology, Plummer, Deal, Griffin, Pearson Education India.
EC518 WIRELESS SENSOR NETWORKS

Unit 1: Introduction:
Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Mobile Adhoc NETworks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks, Sensor Node Hardware and Network Architecture: Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC, Network architecture, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts.

Unit 2: Deployment and Configuration:

Unit 3 Data Storage and Manipulation:
Data centric and content based routing, storage and retrieval in network, compression technologies for WSN, Data aggregation technique. Applications: Detecting unauthorized activity using a sensor network, WSN for Habitat Monitoring.

Books:
EC519  ADVANCED MICROPROCESSOR & EMBEDDED SYSTEM

Unit 1: Microprocessor Architectural Concepts:

Unit 2: Microprocessor Instructions and Communications:
Instruction Set, Mnemonics, Basic Instruction Types, Addressing Modes, Interfacing I/O Microprocessor, Polling And Interrupts, Interrupts And DMA.

Unit 3: Microprocessor I/O:

Unit 4: Embedded Controllers & Systems:
Architecture of 80186 & 80188 CPU subsystems, Addressing Modes, Instruction set, Basic IO subsystems, Memory Subsystem, Example embedded controllers.

Books:
1. Intel Series Of Microprocessors: By Berry B. Bray, TMH.
2. 8086 microprocessor & Architecture by Liu, Gibson; PHI.
3. Embedded Microprocessor System Design by Kenneth L. Short, Pearson Education.
4. Embedded Controllers by Berry B. Bray Pearson Education.
Unit 1: Switched Capacitor Circuits: Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

Unit 2: Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications

Unit 3: Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters


Unit 5: Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multibit quantizers, Delta sigma D/A

Books:
Unit1: Introduction:
Satellite communication, Brief History, Orbits of satellite: Low, medium and geo-synchronous main characteristics, Angle period, Returning period, Angle of Evaluation, Propagation Delay, Orbital spacing.

Unit2: Satellite Links:
Delay transponder, Earth Stations, Antennas and Earth Coverage, Altitude and eclipses.

Unit3: Earth Space Propagation Effects:

Unit4: Synchronization:
Principle and techniques, Multiple Access Techniques, FDMA, SPADE system, TDMA system, Concept and configuration, system timing frames format, SSMA Basu Principles, VSAT, Random Access, Space Communication, link design description of operational in TELSAT and INSAT system.

Books:
Unit 1. Introduction:
Need for low power VLSI chips, Sources of power dissipation in Digital Integrated circuits. Emerging low power approaches. Physics of power dissipation in CMOS devices.


Unit 3. Power Estimation Simulation Power analysis: SPICE circuit simulators, Gate level logic simulation, Capacitive power estimation, Static state power, Gate level capacitance estimation, Architecture level analysis, Data correlation analysis in DSP systems. Monte Carlo simulation. Probabilistic power analysis- Random logic signals, Probability & frequency, Probabilistic power analysis techniques.

Unit 4. Low Power Design Circuit level: Power consumption in circuits, Flip Flops & Latches design, High capacitance nodes, Low power digital cells library Logic level - Gate reorganization, Signal gating, Logic encoding, State machine encoding, Precomputation logic

Unit 5. Low Power Architecture & Systems: Power & performance management, Switching activity reduction, Parallel architecture with voltage reduction, Flow graph transformation, Low power arithmetic components, Low power memory design.

Unit 6. Low Power Clock Distribution: Power dissipation in clock distribution, single driver vs distributed buffers, zero skew vs tolerable skew, chip & package co design of clock network


Books:
Unit 1. Introduction to MEMS:

Unit 2. Mechanics of Beam and Diaphragm Structures:

Unit 3. Air Damping Drag Effect of a Fluid:

Unit 4. Electrostatic Actuation:

Unit 5. Thermal Effects:
Temperature coefficient of resistance, Thermo-electricity, Thermocouples, Thermal and temperature sensors.

Unit 6. Applications of MEMS in RF MEMS:
Resonator Design Considerations, One-Port Micromechanical Resonator Modeling Vertical Displacement Two-Port Microresonator Modeling, Micromechanical Resonator Limitations.

Books:
5. SUGGESTIONS FOR EFFECTIVE IMPLEMENTATION OF CURRICULUM

Curriculum for post graduate programmes in engineering and technology have been designed by SSU Palampur faculty with close cooperation of SSE Badhani and Amritsar. They have understood the systematic approach of curriculum development and implementation. While designing the curriculum they have taken into account employment scenario, equivalence with PTU curriculum and experience of implementing existing curriculum.

Some of the suggestions for effective implementation of curriculum are:

1. Vision and mission of institute, Philosophy objective and outcome of curriculum of programmes should be understood by all teachers and students. These should be displayed in the Department so that expectation of all stakeholders are clear to everyone.

2. Principal with Head of Departments should analyze the curriculum to find out the requirement of resources for its implementation and prepare an action plan for their availability in time. Institute should network with other organizations for sharing resources and adopt innovative approaches for managing whole courses.

3. HOD’s and teachers are managers of whole programmes and subject teaching respectively. Their success in achieving objectives depends on preparing academic plan and its judicious execution.

4. Teachers should prepare rationale and objective of their respective subjects, structure of content, method and media and table of specification for evaluation. This should be given to student so that they are aware of the outcome of the course.

5. Set up a group of teachers and final year students for sharing experiences of curriculum implementation and suggest further improvement.

6. Teachers are required to plan as follows for carrying out teaching learning process effectively:

   (a) Prepare profile of students for knowing their background and strengths so as to facilitate them in fulfilling their dreams of jobs and life.

   (b) Analyze programme and develop teaching plan.

   (c) Plan for guided self study exercises for student and available learning resources like journals, web site, educational video programming etc in addition to visit to industries and organizing industrial training, arranging expert lecture by alumni and experts from industry/field.
(d) The co-curricular activities like organizing different camp, social gathering study tour, hobby club etc may be used to develop generic skills like communication skills, task Management, problems solving, managing self, stress Management, Time Management and collaborating with others etc.

1. A project bank may be developed by the concerned department of the university in consultation with industry, research and other relevant field organizations.

2. Student may be given practical assignment and project to develop practical skills. This will help them in developing creativity and confidence for their gainful employment, (wage and self).

3. (a). Teachers and students should be aware of objectives and outcomes of whole programme and the role played by each subjects in achieving them as part of the curriculum.

(b). Identification of project and their details should be prepared by all teachers in consultation with students at the beginning of the year. The projects should relate to state of art technology and require use of theoretical and advance planning practical knowledge.

©. Self learning and learning beyond syllabus should be encouraged by including optional subjects with scope of learning.

(d). Department should develop a feedback Mechanism for teaching performance and a reward system for doing excellence work.

(e) Academic calendar should include remedial classes and additional make up test to help academically weaker students. Students involved in mentoring junior students should be should be rewarded, who are actively doing mentoring.