B. Tech. Eighth Semester (CBCS)
(Electronics & Communication/ Electronics & Telecommunication /Electronics Engineering)

PEC-VI

CMOS VLSI Design

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC801 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

Objectives:

Outcome: By the end of the course, the students shall be able to

1. Describe and interpret the basic concepts of MOS transistors,

2.Construct the ability to design a system, component or process as per needs and specifications.

3. Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits.

4. Evaluate circuits using different CMOS styles and measure performance of the complex logic structures.

Unit:1 Introduction of MOSFETs (10 Hours)

Introduction of MOSFETs: CMOS Fabrication Process steps, NMOS Enhancement Transistor, MOS Transistor Operations, PMOS Enhancement Transistor, Regions of Operations, Threshold Voltage, MOS Device Equations, Small Signal Modeling of MOSFETs.

Unit:2 Logic Design With MOSFETs (10 Hours)

Logic Design With MOSFETs: Ideal Switches and Boolean Operations, MOSFETs as Switches, Basic Logic Gates in CMOS, Compound Gates in CMOS, Transmission Gate Circuits (TG), Pass Transistor.

Unit:3 MOS inverter Characteristics (9 Hours)

MOS inverter Characteristics: Resistive load inverter, Inverters with n type MOSFET load, CMOS inverter, Principle of operation, DC characteristics, Tristate Inverter, Noise Margin, Introduction to Bi-CMOS Inverter.

Unit:4 Combinational circuit design (9 Hours)

Combinational circuit design, static CMOS, Ratioed Logic circuits, Analysis of CMOS Logic Gates: MOS Device Capacitance, Switching Characteristics, Rise Time, Fall Time, Propagation Delay, Power Dissipation in CMOS, Charge Sharing, Fan-in, Fan-out, Complex Logic Structures, Complementary Static CMOS, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, CMOS Pass Transistor Logic.

Unit:5 Sequential Circuit Design & Data path VLSI System Components: (10 Hours)

Sequential Circuit Design, Latches and Flip Flops. Advanced Techniques in CMOS Logic Circuits: and FlipFlops, data path design, Data path VLSI System Components: Comparators, barrel shifters, Multiplexers, Binary Decoders, Equality Detectors and Comparators, Priority Encoders, Shift and Rotation Operations, Bit Adder Circuits, Multipliers.

Text Books:

1 John P. Uyemura, Introduction to VLSI Circuits and Systems, Students Edition, Wiley Publication.

REFERENCE BOOKS:

1 Neil H. E. WesteHarris, Principle of CMOS VLSI Design, 4th Edition, Addison Wesley VLSI Series.

2 Sung-Mo Kang, Yusuf leblebici, CMOS VLSI Design, Third edition, 2008, TataMcGraw Hill.

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PEC-VI

Artificial Intelligence

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC801 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

Objectives:

Outcome: By the end of the course, the students shall be able to

1. Develop an understanding what is involved in AIML.
2. Understand learning algorithms of AIML.
3. Understand the deep learning.
4. Apply the knowledge for the selection of tool and languages for problem solving
5. Understand the use of AIML for real world problems.

Unit I: Introduction to Artificial Intelligence (9 Hrs.)

What Is Artificial Intelligence? History, AI and Society, Agents and Knowledge based systems, Components of AI

Unit II: Propositional Logic (9 Hrs.)

Propositional Logic, First order logic, limitations of logic, Search, Games and Problem Solving, Reasoning with Uncertainty

Unit III: Machine Learning (10 Hrs.)

Supervised learning, Unsupervised learning, Reinforcement learning: Model based learning, Regression, Decision trees, Linear Discrimination, Kernel Machines and Graphical Models

Unit IV: Artificial Neural Networks and Deep Learning (10 Hrs.)

Biological neural network, Artificial neural network, Hopfield network, Neural Associative memory, Linear networks, Backpropogation algorithm, Support Vector Machines, Basics of deep learning.

Unit V: Introduction to Platforms, Tools, Frameworks and languages for AIML (10 Hrs.)

Top AIML Softwares: Salesforce Einstein, IBM Watson, Deep Vision, Cloud Machine Learning Engine, Azure Machine Learning Studio, Nvidia Deep Learning AI, Playment; Machine learning tools: TensorFlow, Amazon Machine Learning, Accord.NET, Apache Mahout, Shogun; Programming languages: Python, R, Java, Julia, C/C++, Others: Scikit Learn, Theano, Caffe, MxNet, Keras, PyTorch, CNTK, Auto ML, OpenNN, H20: Open Source AI Platform, Google ML Kit

Text Books:

1. Wolfgang Ertel, "Introduction to Artificial Intelligence" 2 nd Edition, UTiCS, Springer

2. Ethem Alpaydın ,"Introduction to Machine Learning" 3rd Edition,The MIT Press, Cambridge, Massachusetts London, England.

REFERENCE BOOKS:

1. John Paul Mueller, Luca Massaron John Wiley & Sons ,"Artificial Intelligence for Dummies" First, 2018

2. Steven W. Knox,Wiley" Machine Learning A Concise Introduction" First, 2018

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PEC-VI

MEMS

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC801 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

Objectives:

Outcome: By the end of the course, the students shall be able to

1. Apply the principles behind the operation of MEMS devices
2. Choose a micromachining technique for a specific MEMS fabrication process
3. Understand recent advancements in the field of MEMS and devices

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Unit - I : (9 Hrs)

Introduction to MEMS: Benefits of Miniaturization, Types of MEMS: Optical MEMS, Bio- MEMS, RF- MEMS, Microfludics, Success Stories, Pressure sensor, Accelerometer, Micro-mirror TV Projector.

Unit - II : (9 Hrs)

Microfabrication and Micromachining : Integrated Circuit Processes, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding, High Aspect-Ratio Processes (LIGA), MEMS Device fabrication using Bulk Micromachining.

Unit - III : (10 Hrs)

Surface Micromachining : One or two sacrificial layer processes, Surface micromachining requirements, Device fabrication using Surface Micromachining example, Microcantilever fabrication.

Unit - IV : (10 Hrs)

RF MEMS Devices : Capacitor, Inductor, Switches, and antennas, RF MEMS components in communications, space and defense applications.

Unit - V : (10 Hrs)

Physical Micro sensors : Classification of physical sensors, Integrated, Intelligent, or Smart sensors, Sensor

Principles and Examples : Thermal sensors, Electrical Sensors, Mechanical Sensors, Chemical and Biosensors.

Text Books:

1. Micro and Smart Systems: Ananthasuresh, G. K., Vinoy, K. J., Gopalakrishnan, S., Bhat, K. N., and Aatre, V. K., Wiley-India, New Delhi, (1/E) (2010).
2. RF MEMS and Their Applications: Vijay Varadan, K. J. Vinoy, K. A. Jose, Wiley, (1/E) (2002).

REFERENCE BOOKS:

1. Microsensors, MEMS and Smart Devices , Julian W. Gardner , Vijay K. Varadan, Osama O. Awadelkarim, Wiley, (1/E) (2001).
2. VLSI Technology, Sze S.M., Mc Graw Hill, (2/E).

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PEC-VII

VLSI Signal Processing

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC802 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

Objectives:

1. To learn pipelining & parallel processing techniques.
2. To understand folding & unfolding techniques in multirate system
3. To address folding techniques used to design time multiplexed architecture.

Outcome: By the end of the course, the students shall be able to

1. Learn various methodologies to optimize power delay and area of VLSI design.
2. Build Real Time processing system.
3. Design of algorithm structure for DSP algorithms based on algorithm transformation

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Unit I: Pipeling and Parallel Processing (09)

Introduction, pipeling of FIR Digital filters Parallel processing, Pipelining and parallel processing for low power.

Unit II: Retiming (09)

Introduction, Definition and properties, solving system of inequalities, retiming techniques.

Unit III: Unfolding (10)

Introduction, algorithms for unfolding, Properties of unfolding, Critical path, unfolding and retiming Application of unfolding.

Unit IV: Folding (10)

Introduction Folding Transformation, Register minimization in folded architectures, Folding in Multirate systems.

Unit V: Fast Convolution (10)

Introduction, Cook- Toom algorithm, Winogard algorithm, Iterated convolution, Cyclic Convolution, Design of Fast Convolution Algorithm by Inspection.

Text Books:

1. Keshab K. Parhi. "VLSI Digital Signal Processing Systems" Wiley-Inter Sciences. 1999

2. Mohammed Ismail, Terri, Fiez, "Analog VLSI signal and information processing", McGraw Hill ,1994.

3. Keshab. Parthi, "VLSI Digital signal processing system Design and implementation" Wiley- Inter science, 1999.

4. kung. S.Y., H.J. While house T.Kailath "VLSI and Modern singal processing", prentice hall, 1985.

5. Jose E. France, Yannis Tsividls "Design of Analog Digital VLSI circuits for telecommunications and signal processing" prentice Hall, 19994.

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PEC-VII

Android Mobile Application Development

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC802 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

COURSE OBJECTIVES:

1. To facilitate students to understand android SDK

2. To help students to gain a basic understanding of Android application development

3. To inculcate working knowledge of Android Studio development tool

COURSE OUTCOMES: At the end of this course, students will be able to:

1. Identify various concepts of mobile programming that make it unique from programming for other platforms,

2. Critique mobile applications on their design pros and cons,

3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
4. Program mobile applications for the Android operating system that use basic and advanced phone features, and

5. Deploy applications to the Android marketplace for distribution.

UNIT - I Introduction to Android: (09)

The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT - II Android Application Design Essentials: (09)

Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT - III Android User Interface Design Essentials: (10)

User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT - IV Testing Android applications (10)

Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT - V Using Common Android APIs:

Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

1.T1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

1. R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd

2. R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd

3. R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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PEC-VII

Satellite Communication

Duration: 3 Hr.
College Assessment: 30 Marks
University Assessment: 70 Marks

Subject Code: BEETC802 PE **[4 –0- 0 – 0]** **Credit: 4-0-0-4**

Objectives:

1. To learn working principle of satellite communication system.
2. To understand the orbital aspects and components of a satellite communication system.
3. To analyze the link budget of a satellite communication system and study of satellite orbits and launching.
4. To get knowledge and relate different components in satellite communication and use them in projects.

Outcome: At the end of the course, the student shall be able to:

1. Do research with capabilities in the design, development and manufacture of satellite communication systems used in a wide spectrum of applications.
2. Experience real world experience from household appliances to sophisticated satellite communication, from electronic ignition to neural networks and signal processing chips & to integrate academic discipline with project-based engineering applications, classroom learning theory
3. Able for Acquisition of technical competence in specialized areas of Satellite Communication engineering.
4. Able to identify, formulate and model problems and find Satellite Communication engineering solutions based on a system approach.

UNIT I: (09)

Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem.

UNIT II: (09)

Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

UNIT III: (10)

Multiple access techniques: FDMA, FDM / FM / FDMA, effects of intermodulation, companded FDM / FM / FDMA, TDMA, TDMA frame structure and design, TDMA synchronization and timing, code division multiple access, SS transmission and reception; Applicability of CDMA to commercial system, multiple access on board processing SCPS system, digital speech interpolation system, DAMA.

UNIT IV: (10)

Propagation on satellite: Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

UNIT V: (10)

Error detection and correction, channel capacity, error detecting codes, linear block codes, error correction with linear block codes, performance of block error correction codes, convolution codes, cyclic codes, BCH and codes, error detection on satellite links. Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station.

Text BOOKS:

1. "Satellite Communication" by T. Pratt. Charles Bostian and Jeremy Allnutt, 2nd Edition, John Wiley & Sons, 2003.
2." Satellite Communication", D. C. Agrawal, Khanna Publishers
3. "Satellite Communication", Dennis Roddy , 4th Edition, McGraw- Hill International edition, 2006.
4. "Satellite Communication", T. T. Hai., Mc.Graw Hill Publications

REFERENCES BOOKS:

1. Satellite Communication Systems Engineering, W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, 2nd Ed., Pearson Education., 2007.
2. Satellite Communication, Mark R Chartrand, Cenage Learning

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Project phase 2

Subject Code: BEETC-803P **[L:0 –P:12- T:0 – 12]** **Credit: 0-6-0-6**

Course Objectives:

The object of Project Work II is to enable the student to extend further the extend project taken up under Project Phase-I, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry

Course Outcome: By the end of the course, the students shall be able to

1. Analyze or Design the Electronics /telecommunication /allied Engineering problems by using appreciate methodology in a team work.
2. Interpret the communication skills of team members and
3. Use of Modern tools in the field of Electronics Engineering

Guidelines:

- In continuation to semester VII project work, the group of the students shall collect all necessary information pertaining to the project and analyse it.
- The group of the students shall prepare and submit a detailed report on the project.
- Student group shall try to implement project in minimum cost and learn financial aspect of project.
- Preferably project definition shall be in discussion and association with any industry
- The report shall be type written on A4 size papers and hard bound as per prescribed norms.
- Broadly the report shall include: Introduction, Literature Review, Problem definition, Data collection and analysis, Results (Numerical / Experimental), Conclusions and discussions.
- Acquaintance with survey and research methods and their use in conducting systematic investigations, use of data analysis tools, computational methods and style of report, preparation and presentation shall form basis of evaluation.
- The group shall prepare and present a seminar based on this work before an external examiner

N.G. Bawane