INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Optimization Methods</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Offered for</td><td>B.Tech/M.Des/Ph.D</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td>DrShalu M A, Dr B Sivaselvan</td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td>Linear Algebra, Calculus</td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To impart knowledge of optimization methods required for design and operational decisions involving engineering systems.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">Engineering applications of optimization (3 hours)
Multivariable optimization, method of Lagrange multipliers, Kuhn-Tucker conditions (5 hours)
Convex sets, convex functions, convex programming problems (4 hours)
Linear programming problems and simplex method (6 hours)
Primal and dual problems (2 hours)
Quadratic programming (4 hours)
Introduction to Genetic Algorithms, Traditional optimization methods, Motivation for Genetic Algorithms(2 Hours)
Mathematical Foundations, Operators – Reproduction, Crossover, Mutation, Fundamental Theorem, Schemata Analysis (5 Hours)
GA Implementation Issues, Advanced Operators – Dominance, Diploidy, Abeyance, Extended Schema Analysis (5 Hours)
Applications of Genetic Algorithms, GA based Classifier System, Tabu Search, and Swarm Optimization (4 Hours)</td></tr>
<tr><td>Text Books</td><td colspan="6">1. A Ravindran, D Philips, J Solberg. Operations Research, Principles and Practice, Wiley, 2nd Edn, 2007
2. D E Goldberg. Genetic Algorithms in Search, Optimization & Machine Learning, Addison Wesley, 2009</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. H A Taha. Operations Research, Prentice Hall, 8th Edn, 2009
2. K Deb, Optimization for Engineering Design – Algorithms, Examples, PHI, 2004
3. S SRao, Engineering Optimization Theory & Practice, John Wiley, 2009</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Introduction to Product Design and Development	Course No	DES 507			
Specialization		Structure (LTPC)	3	0	0	3
Offered for	M.Des. / B.Tech. Elective	Status	Core✓		Elective✓	
Faculty		Type	New✓		Modification	
Pre-requisite		To take effect from	Aug 2011			
Submission date	Aug 2011	Date of approval by AAC				
Objectives	The course would provide the students with an overview of the product development process with focus on the front end of new product development. It would introduce them to the part of the product life-cycle from product planning to concept generation, concept selection and concept testing. The students would be introduced to the relevance and methods of innovation and creativity in product development					
Contents of the course	Modern product development-Need for systemic design - The design process- Types of design - Product planning - Technical and business concerns - Understanding customer needs - Usability engineering- User-centered design- Accessing and mining data- Cultural triangulation - Observation, interrogation -Focus group interviews - Establishing product function - Product benchmarking - Quality function deployment - Concept generation Role of Creativity and innovation -Types of innovation - Patents and IPR Tools for conceptualization - Methods of idea generation - Theory of inventive problem solving - Ergonomics in product design - Concept selection					
Text and References	1. Otto. K and Wood, K, Product Design, Pearson Education, 2001. 2. Henry Pertoki, Invention by design , Universities Press (India) 2000. 3. Ullman. D. G, The Mechanical Design Process, McGraw-Hill, 1997 4. Mike Baxter, Product Design: Practical Methods for the Systematic Development of New Products, CRC Press, 1995 5. George E.Dieter and Linda C.Schmidt, Engineering Design, McGraw-Hill, Fourth Edition,2009					

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Communication networks	Course No *(will be assigned)*				
Specialization	Electronic Engineering	Structure (LTPC)	3	0	0	3
Offered for	UG/PG/Ph.D.	Status	Core ■		Elective ☐	
Faculty		Type	New ■		Modification ☐	
Pre-requisite		To take effect from	Aug 2012			
Submission date	June 2012	Date of approval by Senate				

Objectives	To highlight the importance of building communication networks and various topologies/hierarchy employed in network realization. To Discuss various techniques /algorithms/protocols required in conceiving and implementing a communication network with incorporation of real time examples like ATM, ISDN, SONET, etc. To develop clarity of concepts in the area of internetworking devices and network security related issues. It covers fundamental topics beginning from OSI model to error detection and correction and then details of advanced concepts in switching, ISDN and various algorithm and protocols. At the end of the course, students should develop expertise in conceiving the conceptual understanding of various techniques/algorithm/protocols required in implementing a communication network.
Contents of the course *(With approximate break up of hours)*	**Introduction and basic concepts:** Network Definition, necessity, protocols and standards, line configuration, network topologies, transmission mode, categories of networks: basic types – LAN, MAN, WAN, Wireless networks, Inter networks. **OSI model:** Layered Architecture, Functions of the layers, TCP/IP protocol. (10 hrs) Signals and Data transmission: Analog and Digital data/signal, Periodic, aperiodic, and composite signals, Time and frequency domain, decomposition of a digital signal, Conversion of signals (ADC and vice versa) Digital data transmission, DTE-DCE interface, and interface standards, transmission rate and modems standards. (8 hrs) **Multiplexing and Error detection/correction:** FDM, TDM and WDM, Multiplexing applications: telephone system, DSL and FTTC. Types of errors and redundancy check, Data link control and error control, Data link protocols, Baseband transmission/receiver techniques. (8 hrs) **Different Networks:** LAN, MAN, Circuit/Packet Switching and point to point protocol, Transition states, PPP layers, Link control protocol, Authentication, Example of Data Link Protocol – HDLC – High Level Data Link Control, Data Link Layer in the Internet, Data Link Layer in ATM, ISDN, Frame Relay, ATM, Design goals, Architecture, layers, quality of services, and applications, SONET/SDH, layers, Multiplexing and frames. (12 hrs) **Networking and Internetworking devices:** Repeaters, routers, bridges, gateways, algorithms and protocols, duties of transport layers, Upper OSI layers, OSI transport layers, TCP/IP protocol suite and applications. **Network Security:** Traditional Cryptography, Cryptography principles, Secret Key & Public Key Algorithm, Authentication Protocols, Digital Signatures; DNS – Domain Name System – DNS Name Space, Resource records, Name Servers. (4 hrs)
Textbook	1. B. A. Forouzan, “Data Communications and Networking,” 2007, Tata McGraw Hill. 2. Tanenbaum, “Computer networks,” 2010, Pearson Education.
References	3. Stallings, “Data & Computer Communications,” 2010, Pearson Education. 4.Proakis, “Digital Communication,” 2007, Mc Graw Hill. 5. Mansfield, “Introduction to Computer Networking,” 2002, Pearson Education.

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Design and Applications of Analog ICs</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Offered for</td><td>M.Des. / B.Tech. Elective</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To deal with the analysis, design and applications of analog integrated circuits emphasizing fundamentals as well as new paradigms that students need to master in today’s low voltage, low power, and high density integrated circuits.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">Importance of Operational Amplifiers in Analog and Mixed Signal Circuits (1 hr)
Ideal Op Amp Equations – Non-inverting and Inverting OP AMP. Adders, Differential Amplifiers, and Complex Feedback Networks. Video Amplifiers. (3 hrs)
Non-Ideal Op Amp Equations. Non-inverting and Inverting Opamps, Diff Opamps, (3 hrs)
Voltage Feedback Op Amp Compensation, Internal and External Compensation, Dominant Pole, Gain, Lead and Lead-Lag compensation techniques and comparison (4 hrs)
Current Feedback Op Amp Analysis. Non inv. and Inv. Current Feedback, Stability Analysis. (3 hrs)
Op Amp Noise and S/N Ratio, Shot Noise, Thermal Noise, Flicker Noise, Burst Noise, Avalanche Noise (3 hrs)
Sensors, A/D Converters, and D/A Converters and their characterizations, Transducers- types, Characterization, Selection of Op Amp in an ADC. (4 hrs)
Sine Wave Oscillators. Wien Bridge and Phase Shift oscillators. Phase locked loop. (4 hrs)
Voltage Regulators and ICs, Feedback Voltage Regulator using Op Amp. Short Circuit Protection. (3 hrs)
IC Power Amplifiers. Classification of Power Amplifiers. Audio Amplifiers and their figures of merit. Power Amplifier ICs. (3 hrs)
Active Filters. Low Pass filters – Butterworth, Tschebyscheff filters. First and Second Order Low Pass Filters. First and Second Order High Pass, Bandpass, Band rejection filters, All Pass filters (5 hrs)</td></tr>
<tr><td>Text Books</td><td colspan="6">1. Bruce Carter and Ron Mancini. “OP AMPS EVERYONE.” NewnesPublsihers, 2009.
2. Applications of Analog Electronics. Lab manual by K.R.K. Rao and Krishnamurthy Bhat, 2009.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. L.K. Maheshwari and M.M.S. Anand. “Analog Electronics,” Eastern Economy Edition, Prentice Hall International, 2005.
2. S.P. Bali. Linear Integrated Circuits.McGraw Hill, 2008.</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Digital Signal Processing and Architecture</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Offered for</td><td>M.Des. / B.Tech. Elective</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To develop a signal processing system design methodology as a systematic approach to solving complex application design problems.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">Review (Discrete-time signals, systems and transforms): Basic Sampling theory and A/D conversion, Discrete Time Linear Systems, z- Transform, Pole-Zero locations and stability, Discrete-time Fourier transform, Filtering, Application examples (15 lectures)
Digital Filter Design, FIR, IIR, Basic architectures, Design tools, simulation, Quantization/round-off and finite word-length effects (10 lectures)
Discrete Fourier Transform-DFT definition and applications, FFT, architectures, Fast convolution, Power spectral estimation (10 lectures)
DSP Hardware/Software Architectures: Generic processor architectures, Harvard architecture, DSP specific extensions (MAC, bit-reversal etc.), Floating-point and Fixed point implementations, Design and analysis software, Examples (10 lectures)
Adaptive Signal Processing: Applications – Equalization, Inverse identification etc. LMS, RLS, (Kalman, QRD...) (6 lectures)
Applications: Speech: predictive coding, model based estimation, Communications, Basics of image processing (5 lectures)</td></tr>
<tr><td>Text Books</td><td colspan="6">1. Oppenheim A., Schafer R. and Buck J., Discrete-Time Signal Processing, Pearson Education, 2007
2. Keshab K. Parhi VLSI Digital Signal Processing Systems, Design and Implementation, John Wiley India, 2008
3. Peter Pirsch, Architectures for Digital Signal Processing, John Wiley India, 2009</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. Proakis J.G. and Manolakis D.G., Digital Signal Processing: Principles, Algorithms, and Applications, Pearson Edition, 2007.
2. Singh A. and Srinivasan S., DSP implementation using DSP microprocessors with examples from TMS320C54xx, Thomson-brooks, 2004.</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Analog IC and DSP Practice</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>0</td><td>0</td><td>3</td><td>2</td></tr>
<tr><td>Offered for</td><td>M.Des.</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To impart hands on experience in simulation, analysis, design and application of analog ICs. Students are expected to design and set up Circuits using ICs for different applications including VCOs and PLLs.
To apply digital signal processing concepts in solving system engineering signal processing application problems and in efficient implementation.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">Universal Active Filter, Voltage Controlled Oscillator and Phase Lock Loop, Frequency Lock Loop, Implementation of Discrete Fourier Transform (DFT), Implementation of Fast Fourier Transform (FFT), Reconstruction of original signal from its noisy version, Finite Impulse Response Filter Design, Infinite Impulse Response Filter Design, Adaptive Filter Design, Audio Processing, Image Processing, DSP system Design</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. Applications of Analog Electronics. Lab manual by K.R.K. Rao and Krishnamurthy Bhat, 2009.
2. Bruce Carter and Ron Mancini. “OP AMPS EVERYONE.” Newnes Publishers, 2009.
3. Oppenheim A., Schafer R. and Buck J., Discrete-Time Signal Processing, Pearson Education, 2007.
4. Keshab K. Parhi VLSI Digital Signal Processing Systems, Design and Implementation, John Wiley India, 2008</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Product Conceptualization and Visualization	Course No *(will be assigned)*					
Specialization	Product Design	Structure (LTPC)	1	0	3	3	
Offered for	UG/PG/Ph.D	Status	Core ■		Elective □		
Faculty		Type	New □		Modification ■		
Pre-requisite		To take effect from	Aug 2012				
Submission date	June 2012	Date of approval by Senate					
Objectives	The course highlights the importance of sketching and models as a creative thinking tool, which helps to express, communicate and document ideas through sketches and models. The students will be exposed to method of clay modeling, foam modeling, carving etc. The students will learn the art of systematic design and conceptualize a novel product and communicate the product using models.						
Contents of the course *(With approximate break up of hours) 42 Hrs*	Difference between sketching in Art and Design. Method of Expressing, communicating and documenting technical ideas through sketches and free hand sketches with exercises to sensitize for scale and proportion. (6 Hrs) Importance of Clay, Foam, Wood modeling and modern 3D printing. Examples of renderings and coloured representations used by creative designers; story boarding. (4 Hrs) Aesthetics appreciation using Gestalt principles of examples in product graphics, Art, painting, sculpture. Overview of 3D CAD as a creative design visualizing medium – Visualization using Walk thorough, Exploded views, animations. (4 Hrs) Lab session: Conceptualizing a product Form for an everyday use product in the form of perspective sketches. Emphasis on aesthetics, visual quality, finish, texture and colour. Visualizing it in 3D CAD rendering software, creating presentation views, walkthroughs, and animations for presentations. Fabrication of a simulation/ mockup model of the improved housing/ component/ part using plastics sheets, wood, metal, board, plaster etc in workshop.						
Textbook	1. Alan Pipes, Drawing for Designers; Laurence King Publishing, London 2007. 2. Amye. Arntson; Graphic Design Basics; Thomson 2007. (International student edition) 3. Jon M.Duff& William A Ross; Engineering Design and Visualisation; CENGAGE Learning, India 2009						
References	1. Kevin Otto & Kristin Wood; Product Design: Techniques in Reverse Engineering and New Product development; Pearson, Low priced edition 2004. 2. Choudhury S.K Hazra, Elements of Workshop Technology Vol. 1/2, Asia Publishing House, 1986 3. John Bowers; Introduction to two dimensional design – understanding Form & Function, John Wiely& Sons. 1999.						

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Life Cycle Management</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Offered for</td><td>M.Des. / B.Tech. Elective</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To enable students to understand a new paradigm for product manufacturing, all the way across the product lifecycles in the a most effective way.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">The life cycle management of system – management tasks, life cycle management constraints, life cycle costing.
Product Lifecycle Management: Constructing PLM: PLM Lifecycle Model – Plan, design, build, support, dispose; Threads of PLM: CAD, Engg. Data Management, Product Data Management, Computer Integrated Manufacturing; Characteristics of PLM: Singualrity, Correspondence, Cohesion, Traceability, Reflectiveness, Cued Availability.
Product End Life: Design for end of old product management - Problems of old products in emerging markets - Recovery and economic feasibility of materials such as plastics, rubber aluminum, steel, etc.
Tradeoffs: Applying life cycle thinking to define tradeoffs along the supply, manufacture-use and end of life chain-Effect on the customer-Expectation of the customer-Evaluate product cost versus operating cost, durability, environment and health.
Maintainability- Objectives of maintenance, types of maintenance, factors affecting maintainability, system down time, and maintainability trade-off.
Sustainability: What is sustainability-Use of renewable resources-View to design horizon.</td></tr>
<tr><td>Text Books</td><td colspan="6">1. AnttiSaaksvuori; AnselmiImmonen, Product Lifecycle Management, Springer, 3rd Edition, 2010.
2. Stephen M. Samuel; Eric D., Weeks and Mark A. Kelley, Team-center Engineering and Product Lifecycle Management Basics, Design Visionaries, Inc., 1st Edition, 2006.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. John Stark, Product Lifecycle Management: 21st century Paradigm for Product Realization, Springer, 1st Edition, 2004.
2. Product Lifecycle Management: Driving the Next Generation of Lean Thinking, Michael Grieves, McGraw-Hill, 2005.</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Design for X	Course No	DES 508				
Specialization	Manufacturing Engineering	Structure (LTPC)	3	0	0	3	
Offered for	Ph.D / M.Des / B.Tech	Status	Core✓		Elective✓		
Faculty		Type	New✓		Modification		
Pre-requisite	Design / Manufacturing	To take effect from	August 2011				
Submission date	Aug 2011	Date of approval by AAC					
Objectives	Design for 'X' focuses on various aspects namely assembly, installation, maintenance, validation, manufacture, quality, reuse, speed, cost, environment, test, ergonomics,LCA, maintability, reliability. It is possible to estimate the difficulty of these aspects by following design principlesand eliminate unnecessary issues to design robust products.						
Contents of the course *(With approximate break up of hours)*	DF 'X' Overview - Advantages of applying DF 'X', Process capabilities - Design for Manual Assembly - Design guidelines - Effect of part symmetry, Handling time- Manual Assembly Database - Quality- Design for Quality - SQC- Quality measures - Zero Defect Manufacturing Design for Environment - Design for environmental packaging- Environmentally friendly - Concepts in paper and packaging products - efficient use of materials and space - use of recycled and/or recyclable materials. Life cycle assessment (LCA) - Environmental impact of a product or process - comparison of different products on energy use - toxicity - acidification - CO2 emissions - ozone depletion - resource depletion - Sustainability - Green Manufacturing Ergonomics in Design - Needs of practicing human factors/ergonomics (HF/E)-usability of products, systems, tools, and environments - design and implementation. HF/E research and methods in design - development -prototyping - test and evaluation training- and manufacturing processes of a product or system. Electrical Connections and Wire Harness Assembly - Wire or Cable Harness Assembly- Wire or Cable Harness Assembly - Types of Electrical Connections - Types of Wires and Cables - Preparation and Assembly Times - Analysis Method Design for High-Speed Automatic Assembly and Robot Assembly - Design of Parts for High-Speed Feeding and Orienting - High-Speed Automatic Insertion - Product Design for Robot Assembly Printed Circuit Board Design for Manufacture and Assembly - Design Sequence for Printed Circuit Boards - Types of Printed Circuit Boards - Assembly of Printed Circuit Boards - Estimation of PCB Assembly Costs - PCB Manufacturability. Design for Injection molding - Injection molding materials, Molding cycle, Systems, molds, machine size, cycle time, Cost estimation, Insert molding.						
Text	1. Geoffrey Boothroyd, Peter Dewhurst, Winston Knight, "Product Design for Manufacture and Assembly", Marcel Dekker Inc, Newyork, 2010. 2. CorradoPoli, "Design for Manufacturing", Butterwoth-Heinmann, 2001.						
References	1. James G. Bralla, "Design for Manufacturing Handbook", McGraw Hill, 1998. 2. Paul Drake, "Dimensioning and Tolerancing Handbook", McGraw Hill, 1999.						

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Embedded system design	Course No *(will be assigned)*					
Specialization	Electronic Engineering	Structure (LTPC)	3	0	0	3	
Offered for	UG/PG/Ph.D.	Status	Core ■		Elective ☐		
Faculty		Type	New ■		Modification ☐		
Pre-requisite		To take effect from	Aug 2012				
Submission date	June 2012	Date of approval by Senate					

Objectives

To introduce the concepts of embedded systems, related processors/controllers, issues related to life cycle etc. and real time operating systems.
To introduce design concepts using FPGA and its comparison with dedicated Digital Signal Processors.
To familiarize with System on chip topology and study the trade-offs with FPGAs as SoC platform.

Contents of the course *(With approximate break up of hours)*

Introduction to Embedded Systems: Embedded systems description, definition, design considerations & requirements, embedded processor selection & tradeoffs. Embedded design life cycle. Product specifications, hardware/software partitioning, iterations and implementation, hardware software integration, product testing techniques; Codesign concept. PCI, ISA and VME bus architecture and programming. (10 hrs)

Real Time Operating System: Fundamentals of RTOS. Multitasking Application-Threads; execution, suspension, sharing resources between tasks: Posix timers, message queues. Concurrent programming concepts- Task and events; synchronization and communication. Task scheduling: Time slicing; priority; pre-emption scheduling; interrupt and background tasks. Main features of QNX , VxWORKS and LynxOS. Real Time Embedded systems design and development. (10 hrs)

Introduction to FPGA: From discrete logic to FPGAs, flexibility and functionality, FPGA vs Programmable DSPs, FPGA technology- roadmap, clocking, data and sample rates, slices and configurable logic blocks, memory and registers, performance ratings, families
DSP and FPGAs: FPGA elements for DSP algorithms, Signal Flow Graph techniques, Digital filtering for FPGAs. (10 hrs)

System-on- chip: Design methodologies & flows, IP cores, On-chip network topologies
Embedded Systems & FPGAs: FPGA as a systems on chip platform, FPGA on-chip network standards, FPGAs as custom microcontroller and hybrid DSP microcontroller devices Embedded FPGA Processors: Xilinx PicoBlaze, MicroBlaze, PowerPC, Net FPGA– overviews (12 hrs)

Textbook

1. Vahid and Givargis, "Embedded System Design: A Unified Hardware/Software Approach," 2001, Wiley & Sons.
2. Ronald Sass, Andrew G. Schmidt, "Embedded Systems Design with Platform FPGAs: Principles and Practices," 2010, Elsevier.

References

3. Steve Kilts, "Advanced FPGA Design: Architecture, Implementation, and Optimization," 2007, Wiley-IEEE Press.
4. Pong P. Chu, "FPGA Prototyping by VHDL Examples: Xilinx Spartan-3 Version," 2008, Wiley-Interscience.

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">PCB and Embedded System Design Practice</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>0</td><td>0</td><td>3</td><td>2</td></tr>
<tr><td>Offered for</td><td>M.Des.</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To impart hands on experience in multi layer PCB design so that students would be able to design and develop electronic systems for various applications.

To impart training in Hardware & Software, in specialized area of Embedded Systems so that they can develop embedded systems over a wide range of applications.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">32-bit RISC processor Implementation (Hardware IP Development), Embedded Hardware Design (using Xilinx or Altera), Embedded Software Design (Operating System Design), Booting Embedded Linux on FPGA boards, Embedded System Design using MSP 430 Micro-controller – Peripheral interfacing – Embedded System programming, Embedded System for DSP applications using MSP 430 Micro-controller
Design of multi layer PCBs, testing and validation</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. John Davies, MSP430 Microcontroller Basics, Elsevier, 2008.
2. S. Blonstein and A. Campbell. “OMAP for dummies”. http://focus.ti.com/dsp/docs/dspsplash.tsp?contentId=52451
3. www.beagleboard.org
4. Bruce R. Archambeault James Drewniak, PCB Design for Real-World EMI Control (The Springer International Series in Engineering and Computer Science) 2002
5. KraigMitzner, Complete PCB Design Using OrCad Capture and Layout, Newnes, 2007</td></tr>
</table>

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

<table>
<tr><td rowspan="2">Course Title</td><td rowspan="2">Product Design Practice and Prototyping</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Structure (LTPC)</td><td>0</td><td>0</td><td>6</td><td>4</td></tr>
<tr><td>Offered for</td><td>M.Des.</td><td>Status</td><td colspan="2">Core √</td><td colspan="2">Elective ☐</td></tr>
<tr><td>Faculty
(Not more than two)</td><td></td><td>Type</td><td colspan="2">New √</td><td colspan="2">Modification ☐</td></tr>
<tr><td>Pre-requisite</td><td></td><td>To take effect from</td><td colspan="4">July 2010</td></tr>
<tr><td>Submission date</td><td></td><td>Date of approval by AAC</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">The purpose of this practice course is to give an in-depth practical understanding of the entire process of new product development, which includes visual appearance of products, design for manufacture, design to meet market needs, and design for cost reduction.</td></tr>
<tr><td>Contents of the course
(With approximate break up of hours)</td><td colspan="6">Interdisciplinary team based product design practice oriented project.

Teams will chose a real world or industry sponsored problem / product/ situation to work upon. Students will plan the project, Conduct user requirement study, market opportunities and competitive product study, develop product specification, conduct IPR audits,Conceptualize, visualize & build a prototype/ mockup.Regular presentations of progress and evaluation by other teams.</td></tr>
<tr><td>Reference Books</td><td colspan="6">1. Clive Dym& Patrick Little; Engineering Design: a project based introduction, Johan Wiley & Sons.2004.
2. James Garratt; Design and Technology; Cambridge University Press 1998.
3. Richard Birmingham et al; Understanding Engineering Design, PHI Delhi 1998.</td></tr>
</table>

ANNEXURE II

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

COURSE REVISION

Course Title	Design for Quality & Reliability	Course No *(will be assigned)*	DES 601			
Specialization	Common for M.Des ESD & MSD	Structure (LTPC)	3	0	3	5
Offered for	M.Des / Ph.D	Status	Core ■		Elective ☐	
Faculty		Type	New ☐		Modification ■	
Pre-requisite		To take effect from				
Submission date		Date of approval by AAC				
Objectives	The design students require the knowledge of quality control and reliability. This course provides the integrated approach to reliability-based design and manufacturing of components and systems with quality.					
Contents of the course *(With approximate break up of hours)*	Central Limit Theorem for a family of reliability measures, modeling and reliability analysis of multi-state systems, Weibull data analysis for few or no failures, Markovian performance evaluation methods, software reliability and testing, Design for Reliability - Reliability Analysis- Reliability Testing- Probability Distributions- Performance Standards - Process Capability- Risk Assessment- Design of Experiments- Response Surface Models- Process Capability Modeling- Computation of variation- Probalistic Optimization- Robust Design- Tolerance Analysis- Design verification - Reliability Testing - Control charts. Availability and Maintainability./					
Text and References	Text Books 1. Betsterfield D.H. Quality Control, Prentice Hall Publication, 8th Edition, 2008. 2. K.C. Kapur, L.R. Lamberson, Reliability in Engineering Design, John Wiley & Sons, 1st Edition, 1977. Reference Books 1. A.Birolini, Reliability Engineering, Theory and Practice, Springer, 5th Edition, 2005. 2. Recent Advances in Reliability and Quality in Design, Hoang Pham, Springer Series in Reliability Engineering, ISBN: 978-1-84800-112-1, 2008. 3. Introduction to Statistical Quality Control, Douglas, C. Montgomery, John Wiley & Sons, NY, 2009.					