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

INTRODUCTION OF NEW COURSE

Course Title	Principles of communication systems	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	This is an introductory course needed to let the basic concepts of the students get reviewed in the field of probability and random processes and digital communication. The conceptual base prepared here would empower the students to appreciate the contents of other core courses in a much better way. At the end of the course students should be able to comprehend the mathematical/digital tools/techniques requisite in analyzing and solving the problems in communication systems.					
Contents of the course *(With approximate break up of hours)*	**Brief introduction:** probability theory and random variables. **Random Processes:** definition, stationarity, ensemble averages - mean, auto correlation, auto covariance, time averages and ergodicity, cross correlation, power spectral density, random processes through LTI systems, Gaussian random process and its properties, narrow band processes. (11 hrs) **Introduction to Digital Communication:** elements of digital communication systems, communication channel models. **Quantization and Preprocessing:** uniform and non uniform quantizers, PCM, logarithmic PCM, differential PCM, Delta modulation. (8 hrs) **Signal Representation:** Gram schmidt orthogonalization, MAP and ML criteria for detection, decision regions, correlation receiver structure, matched filter receiver. **Communication through band limited channels:** base band pulse shaping, Nyquist criteria for distortion less transmission, correlative level coding, ISI and eye patterns. (9 hrs) **Pass band modulation schemes:** ASK, PSK - BPSK/QPSK/M-ary PSK, differential encoding and decoding, FSK, CPM and MSK, performance analysis in AWCN channel - probability of error analysis. **Equalization:** linear equalizers, decision feedback equalizers. **Synchronization:** Carrier synchronization, timing synchronization cyclostationary random processes, Markov chains, error control coding - block and convolutional codes, viterbi decoding, spread spectrum communication. (14 hrs)					
Textbook	1. A.Papoulis, S. U. Pillai "Probability, Random Variable and Stochastic Processes," 4th edition, 2002, McGraw Hill. 2. J. G. Proakis "Digital Communications", 4th edition, 2007, McGraw Hill.					
References	3. B. P. Lathi "Introduction to Analog and Digital Communications" , 2009, Oxford University Press. 4. E. A. Lee, D. G. Messerschmitt "Digital Communication", 2004, Kluwer Academic Publishers. 5. P. Z. Peebles "Probabilty, Random Variables and Random Signal Principles," 4th edition, 2001, Tata McGraw Hill.					

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	RF and micro wave circuit 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 teach the students about design and simulation of circuits and systems at microwave and RF frequencies. To cover the modern trends and advanced topics in the area along with classical aspects of RF circuits. The syllabus includes the basics of microwave circuit design, including transmission lines, matching networks, Smith charts, noise, S-parameters, and passive and active element modeling, and then introduces more advanced topics like amplifier design, design for low noise, mixer design, oscillator design, automatic gain control, measurements and system analysis.
Contents of the course *(With approximate break up of hours)*	**Introduction to RF/Microwave concepts and applications**: RF Electronics concepts, RF behavior of passive components, Transmission line theory review, Circuit Representations of two port RF/MW networks. (8 hrs) **Microwave Passive components:** Isolators, circulators, Directional couplers, Duplexers' Matching circuits, Microwave resonators-Introduction to microwave integrated circuits-MIC filter design – filter design by insertion loss method-filter transformation and implementation-stepped impedance filter design-Coupledline filters. (10hrs) The Smith Chart, Application of the Smith Chart in Distributed and lumped element circuit applications, Design of Matching networks. **RF transistor amplifier design:** Unilateral and non-unilateral design –stability considerations-Maximum gain design-Design for fixed gain-One stage and multistage design - Low-noise amplifiers - Design examples. (12 hrs) **Automatic Gain Control Design & Phase Lock Loop Comparison:** AGCs, linearizer, detector, loop filter, integrator, using control theory and feedback systems to analyze AGCs, PLL and AGC comparison. (6 hrs) **Oscillators and mixers:** Basic concepts-negative resistance oscillator-YIG tuned oscillator- Dielectric resonators -single and double balanced mixers-Design steps. **Microwave and RF measurements:** Power, frequency, Standing wave ratio, Impedance measureme Spectrum Analyzer, Network Analyzer. (6 hrs)
Textbook	1. David M.Pozar, "Microwave Engineering," Third Edition, 2005, John Wiley & Sons. 2. Reinhold Ludwig and Pavel Bretchko, "RF Circuit Design: Theory and Applications," 2004, Pearson Education (Asia) Pte. Ltd.
References	3. Matthew M. Radmanesh, "Radio Frequency and Microwave Electronics Illustrated," 2004, Pearson Education (Asia) Pte. Ltd. 4. Scott R. Bullock, "Broadband Communications and Home Networking," 2001, Scitech Publishing.

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

Course Title	Digital signal processing and architecture	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 create an intuitive feel for basic discrete-time signal processing concepts and how to translate these concepts into real-time software using digital signal processor technology. To provide hands-on approach in understanding architecture and programming of DSP processors, and the design of real-time DSP systems.
Contents of the course *(With approximate break up of hours)*	**Review of discrete time systems:** Z-transform, Discrete Fourier transform, FFT, fast convolution, power spectral estimation, Sampling and aliasing. (8hrs) Digital filter design and realization (FIR, IIR), finite word length effects. Adaptive signal processing: Applications, steepest descent algorithm, LMS, variant of LMS, RLS algorithms. (12 hrs) **Multirate signal processing:** Sampling rate conversion, sampling theorem for bandpass signals, digital filter bank analysis and applications, sub-band coding of speech signals. (6 hrs) **Digital signal processors:** Computational characteristics of DSP algorithms and applications, Techniques for enhancing computational throughput: CUDA based DSP architecture, parallelism, pipelining, barrel shifter, MAC unit. (8 hrs) **TMS320C6X architecture:** Functional units, registers, addressing modes, memory architecture, instruction set, interrupts, fixed and floating point format, programming examples and applications. (8 hrs)
Textbook	1. J. G. Proakias and D. G. Manolakis, Digital signal processing: Principles, Algorithms and Applications, 2007, Pearson Edition. 2. Rulph Chassaing and Donald Reay, "Digital signal processing and applications with Tms320C6713 and TMS320C6416, 2008, Wiley.
References	3. A.V. Oppenheim and R.W. Schafer, "Discrete- Time Signal Processing, 2000, PHI. 4. Avtar Singh, Srini Srinivasan, "Digital signal processing implementations: using DSP. microprocessors with examples from TMS320C54xx," 2004, Thomson-Brooks.

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

Course Title	Signal processing and RF practice	Course No *(will be assigned)*					
Specialization	Electronic Engineering	Structure (LTPC)	0	0	3	2	
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 discuss design tradeoffs between implementation complexity and signal quality/communication performance. To implement DSP technology to a wide variety of systems, communications systems, and digital wireless communications systems. To design and implement RF based active and passive components and their performance evaluation.						
Contents of the course *(With approximate break up of hours)*	Implementation of DFT and FFT, reconstruction of original signals from its noisy version, FIR, Filter deign, Audio and image processing, DSP system design, Characteristics of various microwave passive devices-Microwave measurements-study of various microwave integrated circuits-filter design-matching circuit design-design of amplifier for maximum gain and constant gain-low noise amplifier design.						
Textbook	1. Reinhold Ludwig and Pavel Bretchko, "RF Circuit Design: Theory and Applications," 2004, Pearson Education (Asia) Pte. Ltd. 2. Rulph Chassaing and Donald Reay, "Digital signal processing and applications with Tms320C6713 and TMS320C6416, 2008, Wiley.						
References	3. A.V. Oppenheim and R.W. Schafer, "Discrete- Time Signal Processing, 2000, PHI. 4. Avtar Singh, Srini Srinivasan, "Digital signal processing implementations: using DSP. microprocessors with examples from TMS320C54xx," 2004, Thomson-Brooks.						

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

INTRODUCTION OF NEW COURSE

Course Title	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	Course No *(will be assigned)*					
Specialization	Electronics Engineering	Structure (LTPC)	3	0	0	3	
Offered for	UG/PG/Ph.D	Status	Core ☐		Elective ■		
Faculty	Dr. Manoharan M.	Type	New ■		Modification ☐		
Pre-requisite		To take effect from	Jan 2011				
Submission date	November 2010	Date of approval by AAC					
Objectives	With the increasing proliferation of computing devices, limits on the electromagnetic emissions from these devices are necessary to minimize their potential for interfering with radio and wire communications. It is illegal to market a computing device unless its radiated and conducted emissions do not exceed the limits of the regulation in any country. So the digital product designer must learn to incorporate EMC design principles into his/her design in addition to the usual functional design principles. This course is expected to equip the students to design an electronic product which satisfies EMC regulations.						
Contents of the course *(With approximate break up of hours)*	Electronic Equipment and System EMI Concepts- EMC Requirements for Electronic Systems, Equipment Emissions and Susceptibilities Common-Mode and Differential mode Coupling- Mechanisms Including Field to Cable, Ground Impedance, Ground Loop and Coupling Reduction Techniques, Other Coupling Mechanisms, Arcing at switches and its suppression Non ideal behavior of components- resistance, capacitance and inductance of wires, equivalent circuits, Resistors, capacitors, inductors, effect of component leads, digital circuit devices, effect of component variability The Importance of Grounding For Achieving EMC- The Reasons (I.E., Safety, Lightning Control, EMC, etc.), Grounding Schemes (Single Point, Multi-Point And Hybrid), Shield Grounding and Bonding. Importance of Shielding- Shielding Effectiveness, Shielding Considerations (Reflective and Absorptive) Shielding Design, Shielding Compromises Techniques Used in EMI Diagnostics and Fixes, EMC Specifications, Standards and Measurements, EMC Documentation Including a Historical Summary, The Rationale, and a Review of MIL-Stds, FCC and CISPR Requirements. Introduction to Electromagnetic Compatibility, Communications System EMI- Typical Modes of System Interactions Including Antennas, Transmitters and Receivers and Receiver Responses, Elements of Interference, including Antennas, Transmitters, Receivers and Propagation						
Text and References	**Text Books:** 1. Clayton R. Paul ,Introduction to Electromagnetic Compatibility, John Wiley,2006, 2nd Edition. **References:** 1. Henry Ott, Electromagnetic Compatibility Engineering, John Wiley, 2009 2. Clayton, Electromagnetics for Engineers: With Applications to Digital Systems and Electromagnetic Interference,John Wiley, 2004. 3. David A. Weston, Electromagnetic Compatibility: Principles and Applications, Marcel Dekker Inc., 2001, 2nd Edition.						

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

INTRODUCTION OF NEW COURSE

Course Title	Design of communication products	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	The course contents are designed for giving students hands on experience in designing communication products as per datasheet specification. The challenging course contents suggest the instructor for discussing the case studies of actual products and give suitable assignments to the students for designing the products after taking into thermal, mechanical, electronic design considerations.					
Contents of the course *(With approximate break up of hours)*	**Transceiver Design:** dB power, link budgets, system design tradeoffs, gains/losses, Signal-to-Noise, Probability of Error, Bit Error Rate, Eb/No, link margin, tracking noise and signal level through a complete system, effects and advantages of using spread spectrum techniques. (3 hrs) **Transmitter Design:** Various types and system designs of spread spectrum transmitters, PSK, MSK, QAM, OFDM, Other, Pseudo-Random code generator, multiple access TDMA/CDMA/FDMA, antenna sizing, transmit/receive, local oscillator, upconverters, sideband elimination, power amplifiersign, standing wave ratios. (4hrs) **Receiver Design:** Dynamic range, image rejection, limiters, minimum discernable signal, superheterodyne receivers, importance of low noise amplifiers, 3rd order intercept point for intermodulation products, two tone dynamic range, tangential sensitivity, phase noise, mixers, spurious signals, filters, A/D converters, aliasing and anti-aliasing filters, digital signal processors DSPs. (5 hrs) **Testing and Characterization of Transciever:** Signal translation, signal transport, selection of ADC, FPGA, DSP and relevant interface designs and trade-offs, SRAO, SPI, Ethernet. (4 hrs) **Case Study:** Hand held low/high power short/long range device, System specific need, thermal, mechanical, electronic design consideration, speed/power trade-off, interface, compliance engineering, system integration, acceptance test plan. (6 hrs) **Radio layered standards:** Wi-Fi, 2G, 3G, 4G and applications. (2 hrs) **Photonic Devices:** Criterion for choosing Laser diode, LED and Photo detector in fiber optic link, Design and fabrication of all fiber power splitters, filters, multiplexers, System budgeting, length (distance) of the link and issues related to amplifiers and dispersion compensators. (18 hrs)					
Textbook	1. Scott R. Bullock, "Transceiver and Systems Design for Digital Communications," 3rd Edition, Scitech Publishing. 2. Scott R. Bullock, "Broadband Communications and Home Networking," 2001 Scitech Publishing. 3. Cornell Drentea, "Modern Communications Receiver Design and Technology," 2010, Artech House. 4. A.K. Ghatak and K. Thyagrajan, Introduction to fiber optics," 2001, Cambridge University Press.					
References	5. Ilianm F. Egan, "Practical RF System Design," 2003, John Wiley and Sons. 6. K. D. wong, "Fundamentals of Wireless Communication Engineering Technologies (Information and Communication Technology Series," 2011Wiley Publication. 7. A. Goldsmith, "Wireless communications," 2005, Cambridge University Press.					

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>
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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.					

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

INTRODUCTION OF NEW COURSE

<table>
<tr><td>Course Title</td><td>EMIC and Communication Practice</td><td>Course No
(will be assigned)</td><td colspan="4"></td></tr>
<tr><td>Specialization</td><td>Electronic Engineering</td><td>Structure (LTPC)</td><td>0</td><td>0</td><td>3</td><td>2</td></tr>
<tr><td>Offered for</td><td>UG/PG/Ph.D.</td><td>Status</td><td colspan="2">Core ■</td><td colspan="2">Elective □</td></tr>
<tr><td>Faculty</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">Aug 2012</td></tr>
<tr><td>Submission date</td><td>June 2012</td><td>Date of approval by Senate</td><td colspan="4"></td></tr>
<tr><td>Objectives</td><td colspan="6">To give hands on experience on various EMC compliance tests on communication/electronic devices.
To provide understanding of WDM fiber optic link and its characterization.
To understand the concepts in wireless communications through Matlab based experiments.</td></tr>
<tr><td>Contents of the course (With approximate break up of hours)</td><td colspan="6">Familiarization of various EMC pre-compliance test - Study of induced voltages and Pick Measurement of conducted emission using LISN, Measurement of radiated emission –Susceptibility test of various electronic equipments, Networking building, Error control encoder decoder, BER in fiber optic link, Spectral characterization and WDM transmission, Wireless channel emulation and characterization, Matlab based experiment, OFTDM transceiver design, Channel equalizer design, Design and analysis of spectrum estimator, MIMO simulation.</td></tr>
<tr><td>Textbook</td><td colspan="6">1.Cornell Drentea, “Modern Communications Receiver Design and Technology,” 2010, Artech House.
2. R. Hue, and M. O’ Sullivan, “Fiber optic measurement techniques,” 2009, Academic Press.
3. J. G. Proakis, ”Digital Communications”, 4th edition, 2007, McGraw Hill.</td></tr>
<tr><td>References</td><td colspan="6">4.Ilianm F. Egan, “Practical RF System Design,” 2003, John Wiley and Sons.
5. K. D. wong, “Fundamentals of Wireless Communication Engineering Technologies (Information and Communication Technology Series,” 2011, Wiley Publication.</td></tr>
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