

# PEDAGOGICAL INITIATIVES

ELECTRONICS AND COMMUNICATION  
ENGINEERING DEPARTMENT



## INTRODUCTION

### **PEDAGOGICAL INITIATIVES:**

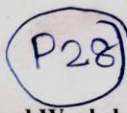

- The knowledge of basic sciences, humanities, industry related curriculum, course on ethical values imbibe in the students the core skills required for their professional accomplishment.
- Understanding and practice of core Electronics & Communication Engineering subjects along with seminar / presentations related to project help in the development of effective communication skills needed for their career building attributes.
- Workshop on Revision of Curriculum held on 15<sup>th</sup>-16<sup>th</sup> June, 2015.
- Industry involvement in program design and curriculum.
- Faculty development programs organized to train and equip our faculty members as per revised curriculum.

## PEDAGOGICAL INITIATIVES

### 1.WORKSHOP ON REVISION OF CURRICULUM

Revised **Curriculum** (Course syllabus) based on Workshop on “Curriculum Review for B.Tech Electronics and Communication Engineering” organized by Department of Electronics, Institute of Engineering and Technology, UPTU, Under Technical Education Quality Improvement Program (TEQIP), held on **15<sup>th</sup> -16<sup>th</sup> June, 2015**.

#### SCHEDULE

**TEQIP Sponsored Workshop on Curriculum Development Program  
June 15-16, 2015**

**Organized by:** Electronics Engineering Department, IET, Lucknow

**Venue:** Hotel Sandstone Inn, A-1/6 Sector H, Aliganj, near Purania chauraha, in front of Indus Scan, Lucknow.

**Agenda:** To review the Course and Curriculum for B. Tech. Electronics and Communication Engineering.

**Schedule**

Date	Time	Events
15 June, 2015	10:00 – 11:00 AM	• Inaugural function and Introduction.
	11:00 – 11:30 AM	High Tea
	11:30 – 01:00 PM	• Presentation on old Course Structure and Syllabus. • Presentation on Proposed Course Structure and Syllabus. • Discussions
	01:00 – 02:00 PM	Lunch
	02:00 – 03:30 PM	• Presentation and Discussion on Proposed Course Structure and Syllabus by Faculty Members from TEQIP Funded Institution.
	03:30 – 04:00 PM	Tea Break
	04:00 – 05:00 PM	• Presentation and Discussion on Proposed Course Structure and Syllabus by Faculty Members from TEQIP Funded Institution contd.
16 June, 2015	10:00 – 11:00 AM	• Presentation on the Existing and Proposed Course Structure before Industry Experts.
	11:00 – 11:30 AM	High Tea
	11:30 – 01:00 PM	• Presentation on the Existing and Proposed Course Structure Before Industry Experts Contd. • Discussions with Industry experts
	01:00 – 02:00 PM	Lunch
	02:00 – 03:30 PM	• Deliberation from Industrial Experts for Suitable Changes to be incorporated.
	03:30 – 04:00 PM	Tea Break
	04:00 – 05:00 PM	• Finalization of Course Structure and Syllabus.
	05:00 – 05:30 PM	• Valedictory and Certificate Distribution.

**List Of Experts For Curriculum Review Workshop For Btech  
Electronics And Communication Engineering**

**INDUSTRY EXPERTS**

<b>Sr No</b>	<b>Name</b>	<b>Organisation</b>
1	Er Rajesh Gupta	Airtel ,Lucknow
2	Er S K Srivastava	BSNL ,Lucknow
3	Er Mahidhar Pant	BSNL ,Lucknow
4	Er Asif Siddiqui	ISRO ,Lucknow
5	Er P P Shukla	Doordarshan ,Lucknow
6	Er Ajay Kumar Chaudhary	Softpro Ltd ,Lucknow
7	Er B C Tripathi	ISTRAL/ISRO ,Lucknow
8	Yashi Asthana	Softpro India ,Lucknow

**ACADEMIC EXPERTS**

<b>Sr No</b>	<b>Name</b>	<b>Organisation</b>
1	Prof. Yogesh Chauhan	IIT, KANPUR
2	Prof. Kunwar Vaibhav Srivastava	IIT , KANPUR
3	Prof. Rajiv Tripathi	MNIT , ALLAHBAD
4	Prof. B R Singh	IIIT, ALLAHBAD
5	Prof. Shirsu Varma	IIIT , ALLAHBAD

# "Curriculum Review Workshop for B. Tech. Electronics and Communication Engineering"

Organized by the Department, on 15-16 June, 2015

## List of Participants

Sr. No.	Name	Organization	Designation	Contact No.	E-Mail Id	Signature
3	1 Prof. Rachna Asthana	HBTI, Kanpur	Professor	9450136807	rachnaasthana@rediffmail.com	
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6	4 Prof. Rakesh Kumar Singh	KNIT, Sultanpur	Professor	9450712650	rks_sat@rediffmail.com	
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8	6 Prof. D.C. Dhupkaria	BIET, Jhansi	Professor	9415194924	dcd3580@yahoo.com	
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# "Curriculum Review Workshop for B. Tech. Electronics and Communication Engineering"

Organized by the Department, on 15-16 June, 2015

## List of Participants

Sr. No.	Name	Organization	Designation	Contact No.	E-Mail Id	Signature
22	Er. Piyush Singh	IET, Lucknow	Lecturer	9634040225	piyushsingh86@gmail.com	
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38	Anu Bharti	IRDT, Kanpur	Lect. E&T	9415544327	lucknow_palyteknoc@yahoo.com	
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38	DR S.S. Soam	IET, Lucknow	System Manager	879599946	sssoam@sdet.ca	
39.	DR. RAJIV KUMAR	IET, Lucknow	Ass. Prof.	8004911322	rkumar@ietlucknow.edu.in	
40.	Litil Kumar	IRDT Kanpur	HOD E&T	9412573394	kumarlitil2@gmail.com	

# PEDAGOGICAL INITIATIVES

## MEDIA GALLERY



## PEDAGOGICAL INITIATIVES

### 2. INDUSTRY INVOLVEMENT IN PROGRAM DESIGN AND CURRICULUM

- ❖ **Industry supported theory courses and laboratories:** Electronics and Communication Engineering Department has Centre of Excellence developed by Texas Instrument. **Dr. Abdul Kalam Technical University, Lucknow** inaugurated the **Texas Instruments Center of Excellence** on 23 December 2015 to bridge the diverging gap between academics and industry requirement. AKTU and Sapience Consulting- Texas instruments University program partner signed an MOU to adopt a revised curriculum based on Texas Instruments Technology. To ensure this the university announced the inauguration of Texas Instruments Center of Excellence in Institute of Engineering



College, Lucknow . Dr. Vinay Kumar Pathak, honorable Vice Chancellor of AKTU said “We are excited about the association with Sapience Consulting which will help us produce industry ready and help us equip our faculty with state of the art technology. This will allow us to further provide faculty with ability to build technical expertise with experimental learning on TI Analog and Embedded Technologies”. This curriculum revision will facilitate students and professors to stay a step ahead of the conventional mode of learning as well as teaching. According to Ms. Apurva Verma, Director Operations, Sapience Consulting “Collaborating with the university is another step towards building a larger industry ready engineering community through experimental learning”. The TI Center of Excellence is instrumental in training faculty and students on TI educational platforms.



## PEDAGOGICAL INITIATIVES

- ❖ **Industry involvement in the program design and Curriculum:** An expert from Industry is considered to be a member of Department Assessment Committee and board of studies who takes active role in the design of Curriculum gap. The institution has MOUs with various industries to strengthen the relationships with industry. Some laboratories and theory courses are added in the program design and Curriculum which are REC 401, REC 451, REC 501 and REC 551.

[Effective from Session 2017-18] (Choice Based Credit System)

### B.TECH. SECOND YEAR

#### B. TECH. FOURTH SEMESTER (I)

<b>REC401: MICROPROCESSORS &amp; MICROCONTROLLERS</b>		
<b>UNIT</b>	<b>Topic</b>	<b>Lectures</b>
I	<b>8085 MICROPROCESSOR:</b> History and Evolution of Microprocessor and their Classification, Architecture of 8085 Microprocessor, Address / Data Bus multiplexing and demultiplexing. Status and Control signal generation, Instruction set of 8085 Microprocessor, Classification of instructions, addressing modes, timing diagram of the instructions	<b>7</b>
II	<b>Hardware Interfacing with 8085:</b> Methods of data Transfer and Interrupts of 8085 microprocessor: Classification of interrupts, Programming using interrupts, Direct Memory Access, Serial and parallel data transfer, Interfacing of Memory Chips with 8085 Microprocessor, Interfacing of 8085 with 8155/8156 (RAM), 8355/8755 (ROM). Interfacing of Programmable Devices with 8085 Microprocessor, 8279 programmable Keyboard/Display interface, 8255A programmable Parallel interface, 8254 programmable Interval Timer, 8259A programmable Interrupt Controller, Assembly language programming.	<b>9</b>
III	<b>16-bit low power MCU MSP430:</b> Introduction to microcontrollers and embedded systems, Von Neumann (Princeton) and Harvard architecture, RISC and CISC machine, Introduction to MSP430: Architecture, Programming Techniques, Addressing Modes, Programming System registers and configuration I/O ports pull up/down registers concepts, Low Power aspects of MSP430: low power modes, Active vs Standby current consumption.	<b>8</b>
IV	<b>Configuring Peripherals in MSP430:</b> External interrupts and software interrupt, interrupt programming, Watchdog timer, Clock Tree in MSP430, Timer/ counter interrupt, Programming MSP430 timer, counter programming, Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.	<b>8</b>
V	<b>Serial Communication Interfaces in MSP430:</b> Basics of serial communication, mode of serial communication, RS232, serial communication issue, Serial port programming. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices, external memory, keyboards, display devices, DAC/ADC, DC Motor, Stepper Motor, Servomotor, power management, Sensor Interfacing and signal conditioning. Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: "A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID.	<b>8</b>

## PEDAGOGICAL INITIATIVES

### REC451: MICROPROCESSORS & MICROCONTROLLERS LAB

1. Learn and understand how to configure MSP-EXP430G2 Launchpad digital I/O pins. Write a C program for configuration of GPIO ports for MSP430 (blinking LEDs, push buttons interface).
2. Usage of Low Power Modes: Configure the MSP-EXP430G2 Launchpad for Low Power Mode (LPM3) and measure current consumption both in active and low power modes. Use MSPEXP430FR5969 as hardware platform and measure active mode and standby mode current
3. Learn and understand GPIO based Interrupt programming. Write a C program and associated GPIO ISR using interrupt programming technique.
4. Implement Pulse Width Modulation to control the brightness of the on-board, green LED. This experiment will help you to learn and understand the configuration of PWM and Timer peripherals of the MSP430G2553.
5. The main objective of this experiment is to control the on-board, red LED by the analog input from a potentiometer. This experiment will help you to learn and understand how to configure an ADC to interface with a potentiometer.
6. Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.
7. Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.
- 8 . Configure of Universal Serial Communication Interface (USCI) module of MSP430G2553 for UART based serial communication. The main objective of this experiment is to use UART of the MSP430G2553 to communicate with the computer.
9. Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

## PEDAGOGICAL INITIATIVES

[Effective from Session 2018-19] (Choice Based Credit System)

**B.TECH. THIRD YEAR**  
**B. TECH. FIFTH SEMESTER (I)**

<b>REC-501</b>		<b>INTEGRATED CIRCUITS</b>	
<b>Unit</b>	<b>Topic</b>		<b>Lectures</b>
I	<p><b>Analog Integrated circuit Design:an overview:</b> Current Mirrors using BJT and MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Widlar Current source and Cascode current Mirror</p> <p><b>The 741 IC Op-Amp:</b> Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; DC Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, Slew Rate, Relationship Between ft and SR</p>	10	
II	<p><b>Linear Applications of IC op-amps:</b> An Overview of Op-Amp (ideal and non-ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors.</p> <p><b>Filters:</b> Ist and IInd order LP, HP, BP BS and All pass active filters, KHN.</p>	8	
III	<p><b>Digital Integrated Circuit Design-An Overview:</b> CMOS Logic Gate Circuits: Basic Structure CMOS realization of Inverters, AND, OR, NAND and NOR Gates</p> <p><b>Latches and Flip flops:</b> The Latch, The SR Flip-flop, CMOS Implementation of SR Flip- flops, A Simpler CMOS Implementation of the Clocked SR Flip-flop, D Flip-flop Circuits.</p>	8	
IV	<p><b>Non-Linear applications of IC Op-amps:</b> Log– Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Simple and Hold Circuits, Analog Multipliers and their applications. Op- amp as a comparator, Zero crossing detector, Schmitt Trigger, Astable multi vibrator, Mono stable multi vibrator, Generation of Triangular Waveforms</p>	7	
V	<p><b>D/A and A/D converters Integrated Circuit Timer:</b> The 555 Circuit, Implementing a Monostable Multivibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC.</p> <p><b>Phase locked loops (PLL):</b> Ex-OR Gates and multipliers as phase detectors, Block Diagram of IC PLL, Working of PLL and Applications of PLL.</p>	7	

**Text Books:**

1. Sedra and Smith, "Microelectronic Circuits", 6th Edition, Oxford University Press.
2. Michael Jacob, "Applications and Design with Analog Integrated Circuits", PHI, 2nd Edition.

**Reference Books:**

3. Jacob Millman and Arvin Grabel, "Microelectronics", 2nd Edition, Tata McGraw Hill.
4. Behzad Razavi, "Fundamentals of Microelectronics", 2nd Edition, Wiley.
5. Mark N. Horenstein, "Microelectronic Circuits and Devices", PHI.
6. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley.
7. Data Sheet: <http://www.ti.com/lit/ds/symlink/tl082.pdf>
8. Application Note: <http://www.ti.com/lit/an/sloa020a/sloa020a.pdf>
9. MPY634 Data Sheet: <http://www.ti.com/lit/ds/symlink/mpy634.pdf>
10. Application Note: <http://www.ti.com/lit/an/sbfa006/sbfa006.pdf>
11. ASLK Pro Manual: ASLK Manual

## PEDAGOGICAL INITIATIVES

### REC551: INTEGRATED CIRCUITS LAB

**Objective:** - To design and implement the circuits to gain knowledge on performance of the circuit and its application. These circuits should also be simulated on Pspice and implemented using TL082, LM741, NE555, ASLK, MPY634 KP connecting wires, Power Supply, function generator and oscilloscope.

1. Design and test a function generator that can generate square wave and triangular wave output for a given frequency and cascade a multiplier MPY634KP in feedback loop to form VCO
2. Voltage to current and current to voltage convertors.
3. Second order filters using operational amplifier in universal active filter topology for-
  - a) Low pass filter of specified cut off frequency.
  - b) High pass filter of specified frequency.
  - c) Band pass filter with unit gain of specified pass band
  - d) Design a notch filter to eliminate 50Hz power line frequency.
4. Wien bridge oscillator using operational amplifier.
5. Astable and mono-stable multivibrators using IC 555.
6. Design the following amplifiers:
  - a) A unity gain amplifier.
  - b) A non-inverting amplifier with a gain of "A".
  - c) An inverting amplifier with a gain of "A".
  - d) Log and antilog amplifiers.
  - e) Voltage comparator and zero crossing detectors.
7. Design and test a PLL to get locked to a given frequency „f“. Measure the locking range of the system and also measure the change in phase of the output signal as input frequency is varied within the lock range.
8. Design and test the integrator for a given time constant.
9. Design and test a high-Q Band pass self-tuned filter for a given center frequency.
10. Design and test an AGC system for a given peak amplitude of sine-wave output.
11. Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250IC.
12. Design of a switched mode power supply that can provide a regulated output voltage for a given input range using the TPS40200 IC.

## PEDAGOGICAL INITIATIVES

### 3. FACULTY DEVELOPMENT PROGRAMS ORGANISED TO TRAIN AND EQUIP OUR FACULTY MEMBERS AS PER REVISED CURRICULUM

❖ **Industry involvement in partial delivery of any regular courses for students:**

Electronics and Communication Engineering Department organized Workshop sessions by Expert from Texas Instrument Ltd. and these sessions also consist of Lab classes (followed by theory) under the Centre of Excellence in the Department developed by Texas Instrument as given in table below.

<b>Title</b>	<b>Offered by</b>	<b>Level</b>	<b>Duration</b>	<b>No of students enrolled</b>
Workshop on “Microcontroller Design using MSP430	Texas Instrument	August 24th -26 <sup>th</sup> , 2017	Three day	Around 30 faculty and 30 students of 2nd yr
Workshop on “Embedded System Design”	Texas Instrument	Feb 08th -10 <sup>th</sup> , 2016	Three day	Around 30 faculty and 30 students of 3rd yr
Faculty Development Program & Workshop on “Linear Integrated Circuits- A system Approach”	Texas Instrument	Feb 04th -06 <sup>th</sup> , 2016	Three day	Around 30 faculty and 30 students of 3rd yr