## Teaching and Evaluation Scheme

<table>
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<tr>
<th>Sr. No.</th>
<th>Course Code</th>
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<th>Contact Hours</th>
<th>Credits</th>
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Industrial Training /Certificate course to be completed during Third Year.
Total Contact Hrs : 30
Total Credits : 29
ISE : In Semester Evaluation.
MSE : Mid Semester Examination.
ESE : End Semester Examination

Implemented from year 2014-15
Rajarambapu Institute of Technology, Rajaramnagar.
(An Autonomous Institute)

Final Year B. Tech  Electronics & Telecommunication

Semester-VIII
Teaching and Evaluation Scheme

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Total Contact Hrs : - 25
Total Credits : - 24
ISE : - In Semester Evaluation.
MSE : - Mid Semester Examination.
ESE : - End Semester Examination

Implemented from year 2014-15
## ELECTIVE LIST

**Program Elective-I List:**

1. Satellite Communication (EC409)
2. Biomedical Instrumentation (EC411)

**Program Elective-II List:**

1. Embedded System Design using MSP430 (EC408)
2. Computer Architecture (EC410)

**List of Open Electives offered at Institute level for B.Tech Programme**

**Semester VII**

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<th>Department</th>
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<td>Non Conventional Energy Sources for Automotives</td>
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<td>Automobile</td>
<td>Hydraulic and Pneumatic Systems</td>
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Implemented from year 2014-15
**List of Open Electives offered at Institute level for B.Tech Programme**

**Semester VIII**

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Implemented from year 2014-15
1. Maximum number of students per elective should be limited to 60 and minimum is 30. The admissions to electives is based on the preference of students and incase of more than sixty students opt for the elective, allotment will be based on the criteria fixed and announced by respective departments.

2. A one page write of the course should be made available to the students containing the learning outcomes, focus of the course, prerequisites if any and evaluation scheme and any course project are offered.

3. Faculty should also communicate for which programme students it is designed and beneficial and also the focus in curriculum to balance the requirement of specified programme students and major benefits after the course.

4. There is an option to exercise the course project of 20 percentage weight age (instead if ISE), if the course demand practical/field exposure.

5. No transfer from one elective to another is entertained after the second week of teaching of the course.

6. Such students who feel that their choice is wrong and can’t cope up with the course should immediately meet concerned head of department and change the same based on their choice and availability of seats in that programme. No change is permitted from the beginning of third week onwards.

Implemented from year 2014-15
COURSE DESCRIPTION:
In this course, a curriculum model including recent developments and technologies in the Radio Frequency (RF) and Microwave Engineering field by using a blended approach is proposed. This study covers the description of the content of theoretical and hands on applications, the integration model. The main goal of the course is to prepare students for future professional careers in RF and Microwave Engineering by supporting them with new instructional technologies. The course is structured with a balance between theory and laboratory.

COURSE OUTCOMES:
After completion of this course students will be able to:

1. Apply electromagnetic theory to calculations regarding waveguides.
2. Understand the calculations of S parameters and microwave components.
3. Analyze and design basic microwave circuits and devices e.g matching circuits, couplers.
4. Classify the different types of microwave sources with its construction and working.
5. Describe microwave semiconductor devices, high-speed transistors, ferrite devices, microwave amplifiers.

PRE-REQUISITES:
There is no pre-requisite for this course; however knowledge of Electromagnetic theory is beneficial.

Implemented from year 2014-15
UNIT-I
MICROWAVE WAVE GUIDES: Rectangular and circular wave guides: TE and TM modes in wave guides, power Transmission in wave guide, power losses in wave guide, mode excitation in wave guides, Characteristics of standard wave guides.

UNIT-II

UNIT-III

UNIT-IV
MICROWAVE SEMICONDUCTOR DEVICES: Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs -Principles of tunnel diodes - Varactor and Step recovery diodes – Transferred Electron Devices - Gunn diode.

UNIT-V
MICROWAVE AMPLIFIERS: Two port power gains, Gain and stability, Single stage Transistor amplifier design: Design for Maximum Gain (Conjugate matching), Constant gain circles and design for specified gain (Unilateral device), Low noise amplifier design.

Implemented from year 2014-15
UNIT-VI

MICROWAVE NETWORK ANALYZERS, MMIC, MICROWAVE HAZARDS AND APPLICATIONS: Introduction, Reference plane, Elements of a microwave network analyzer, Network analyzer block diagram. Microwave monolithic integrated circuit (MMIC), microwave hazards (Specific Absorption Rate), microwave applications (Microwave Oven, etc.).

TEXT BOOK:


REFERENCES:


Implemented from year 2014-15
COURSE DESCRIPTION:
Television technology has now become a vital tool to the information revolution that is sweeping across the countries of the world. This course aims at a comprehensive coverage of analog television, Digital Television, HDTV and video recorders. This gives a comprehensive coverage of TV Systems with all the new developments in Television and Video Engineering. It includes the analysis and synthesis of TV Pictures, Composite Video Signals. This course deals with various Color Television receivers. It focused on advanced topics in digital television and consumer applications.

COURSE OUTCOMES:
After completion of this course students will be able to:

1. Select television standards.
2. Demonstrate functional block diagram of television transmitter and receiver.
3. Develop CCTV set up.
4. Differentiate LCD, LED and Plasma television sets.
5. Summarize consumer Applications.

PREREQUISITE: Nil.

UNIT-I

Implemented from year 2014-15
UNIT-II
TV STANDARDS: NTSC, PAL, SECAM systems, colour TV transmitter, high level, low level transmitters, colour TV receivers, remote control, antennas for transmission, Satellite Television Technology.

UNIT-III

UNIT-IV
HDTV: HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV satellite Systems, video on demand, CCTV, CATV, direct to home TV, set top box with recording facility, conditional access system (CAS), 3D TV systems, Digital broadcasting, case study (Cricket match, Marathon, Foot ball match).

UNIT-V

UNIT-VI
CONSUMER APPLICATIONS: Colour TV Digital cameras, Camcoders, Handycams, and Digicams, Display devices: LED, LCD, TFT, Plasma, HDTV, CD/ DVD player, MP3 player, Blue Ray DVD Players, MPEG, and MP3.
REFERENCE BOOKS:


Implemented from year 2014-15
COURSE DESCRIPTION:
This course covers the basics of power semiconductors devices, firing and commutation circuits of the thyristor and provides in depth knowledge of power converters. It also deals with some of the applications of power electronics.

COURSE OUTCOMES:
After completion of this course students will be able to:

1. Plot the characteristics of power devices.
2. Explain turn-on & turn-off of thyristor, converters, inverters and applications of power electronics.
3. Find performance parameters of the converters.
5. Design converter circuits for the given specifications.

PREREQUISITE:
There is no prerequisite for this course; however the knowledge of basic electronics and network theory will be beneficial.

UNIT-I
SEMICONDUCTOR POWER DEVICES: Characteristics of SCR, TRIAC, DIAC, GTO, power diodes, power transistors, power MOSFET and IGBT. Rating of power devices, series and parallel connections of SCRs, SCR protections- dv/dt, di/dt, over voltage and over current protection.
UNIT-II
TURN-ON AND TURN-OFF OF SCR: Basic requirements for successful firing of thyristor, pulse transformer, opto isolators, Gate trigger Circuits, SCR commutation techniques: natural commutation, forced commutation, class A, B, C, D and E commutation techniques.

UNIT-III
PHASE CONTROLLED CONVERTERS: Single phase half wave full wave controlled rectifiers with R and RL loads, operation with freewheeling diode, performance factors of the converters, examples, dual converter, three phase half wave, half controlled and fully controlled rectifiers with resistive load.

UNIT-IV
DC - DC CONVERTERS: Principle of operation of chopper, classification on the basis of operating quadrants, step-down converter, step-up converter, examples, multiphase choppers, examples.

UNIT-V
PWM INVERTERS: Basic inverter operation, Single phase bridge inverters, classification of inverters, performance parameters, three phase inverters, harmonic elimination methods, examples.

UNIT-VI
POWER ELECTRONICS APPLICATIONS: Uninterrupted Power Supply (UPS), Switched Mode Power Supply (SMPS), HVDC transmission, Battery charger, Circuit breakers, Induction heating and Dielectric heating, Integral cycle triggering, Introduction to PLC.

Implemented from year 2014-15
TEXT BOOKS:

REFERENCE BOOKS:
B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC407 EMBEDDED SYSTEM DESIGN

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</table>

COURSE DESCRIPTION:
Embedded Systems is offered as the core course at the second semester of Electronics & Telecommunication under-graduate programme. An embedded system is a computer system designed to do one or a few dedicated and or specific functions. Embedded system is dedicated to specific tasks; designer can optimize it to reduce size & increase reliability & Performance. Embedded systems such as operating systems & microprocessors that power them but they allow different applications to be loaded & peripherals to be connected. The course will terminate with a significant final project on system design & students will become exposed to the embedded controllers & its instruction set.

COURSE OUTCOMES:
After learning the course the students will able to
1. Apply knowledge of mathematics, science, and engineering.
2. Analyze the embedded system design flow.
3. Write a code in embedded C using modern engineering tools.
4. Design an embedded system for the given specification.
5. Optimize the embedded system to increase the reliability & performance.

Implemented from year 2014-15
PRE-REQUISITES:
The students should have an understanding of Microprocessor, Microcontrollers & Digital signal processing. They know how to write computer programs, and had some exposure to assembly language programming in general. In this course the students know how to design dedicated & or specific function embedded systems and designer can optimize it to reduce size, increase reliability & Performance.

UNIT-I
EMBEDDED SYSTEMS INTRODUCTION: Design Metrics, Processor Technology, Design Technology, Single purpose Processor Design, RT level design, Optimization, Components of an embedded system, embedded system design issues & Design flow.

UNIT-II
ARCHITECTURAL FEATURES OF ARM: Processor modes, Register organization, Exceptions and its handling, Memory, Memory-mapped I/Os, ARM and THUMB instruction sets, Addressing Modes, DSP extensions, ARM sample codes, Pipelining, Special addressing modes, on chip peripherals.

UNIT-III
ARM7/9 CORE: H/W architecture, Timing diagrams for Memory access, Co-processor interface, Debug support, Scan chains, and Embedded Real Time ICE, Hardware and software breakpoints, Buses: AMBA, ASB, APB

UNIT-IV
RTOS CONCEPTS: Foreground and background systems, Critical section, Shared Resources, Tasks, Multitasking, Context Switching, Kernels, Preemptive and non Preemptive Schedulers, Static and Dynamic Priorities, Priority Inversion, Mutual exclusion, Synchronization, Inter task communication mechanisms, Interrupts: Latency, Response and recovery, Clock Tick, Memory Requirements.

Implemented from year 2014-15
UNIT-V
RTOS DESIGN: Basic design uses RTOS with the ISRs and Tasks, Tasks, Task States, Task Scheduling. RTOS scheduling models Overview of Commercial RTOS, μCOS-II, Linux. Structure of uCOS-II Kernel Structure.

UNIT-VI
PORTING OF μCOS-II: Development Tools, Directories and Files, Configuration and testing of Port. Real Time Application using μCOS-II Case study of Samsung ARM & T18000 ARM9 implementations, Development tool like Compilers, Debuggers, and IDE etc.

TEXTBOOKS:
1. ARM System Developer’s Guide by A.N. Sloss, D. Symes and C. Wright; Elsevier Publisher; 2006
2. TMH Steve furber, ARM System-on-Chip Architecture, Pearson Education
4. Real-Time Systems Theory & Practice by Rajib Mall, Pearson Publication

REFERENCE BOOKS:
1. Embedded System Design by Steve Heath, Elsveir Publisher; 2006
2. Embedded Systems by Raj Kamal, TMH; 2006
3. Embedded Microcomputer Systems, Thomson Publisher; 2005
4. Technical reference manuals from Edgate, Bangalore

Implemented from year 2014-15
COURSE DESCRIPTION:

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Understand the fundamentals of orbital mechanics.
2. Design an accurate link budget for a satellite.
4. Demonstrate an understanding of various applications of satellite communication system such as Direct Broadcast Satellite Television and Radio.
5. Specify the importance of satellite communications for applications like which is primary means of navigation.

PREREQUISITE:
The prerequisite for this course is the knowledge of analog and digital communication, and applied physics.

UNIT-I
ORBITAL MECHANICS AND LAUNCHERS: History of Satellite Communication, satellite communication in 2000, Orbital Mechanics, Look angle determination, Orbital perturbations,

Implemented from year 2014-15
Orbital determination, Launchers and Launch Vehicles, Orbital effects in communication system performance.

UNIT-II


UNIT-III


UNIT-IV

VSAT SYSTEM, LEO AND NGSO SYSTEMS: Introduction, Overview of VSAT Systems, Network Architecture, VSAT Earth Station Engineering, Orbit considerations, Coverage and frequency Consideration, Delay and Throughput consideration.

UNIT-V


UNIT-VI


TEXT BOOKS:


REFERENCE BOOKS:


Implemented from year 2014-15
COURSE DESCRIPTION:
Biomedical instrumentation is the application of engineering principles and design concepts to medicine and biology for healthcare purposes (e.g. diagnostic or therapeutic). This field seeks to close the gap between engineering and medicine. It combines the design and problem solving skills of engineering with medical and biological sciences to advance healthcare treatment, including diagnosis, monitoring, and therapy.

Biomedical instrumentation has only recently emerged as its own study, compared to many other engineering fields. Such an evolution is common as a new field transitions from being an interdisciplinary specialization among already-established fields, to being considered a field in itself. Much of the work in biomedical engineering consists of research and development, spanning a broad array of subfields. Prominent biomedical instrumentation applications include the development of biocompatible protheses, various diagnostic and therapeutic medical devices ranging from clinical equipment to micro-implants, common imaging equipment such as MRIs and EEGs etc.

PREREQUISITE:
Students intending to apply to the biomedical Instrumentation major should have studied at least advanced algebra and trigonometry and ideally including calculus. Also students have studied science of chemistry, biology, and physics. Students should be familiar with fundamentals of electronics and transducers. Students without this preparation may be required to take additional courses to prepare themselves for the course.

Implemented from year 2014-15
COURSE OUTCOMES:
After completion of this course students will be able to:

1) Interpret technical aspects of medicine.
2) Identify and evaluate challenges and opportunities concerning the applications of the latest health care sector.
3) Explain medical diagnosis and therapy.
4) Record the Bio Signal and analyze it.
5) Compare the different preamplifiers used for amplifying the Bio Signals.

UNIT-I

PHYSIOLOGY OF SYSTEMS AND ELECTRODES: Man Instrument system, Physiology systems of the body. Bioelectric potential, Resting and action potential, Biopotential electrodes, different types of electrodes, Equivalent circuits for electrodes, Biochemical Transducers.

UNIT-II

CARDIOVASCULAR AND RESPIRATORY SYSTEM AND ITS MEASUREMENTS: Cardiovascular system, Blood pressure, characteristics of blood flow, Heart sounds, ECG, Measurement of blood pressure, blood flow, heart sounds and cardiac output Plethysmography. Elements of ICU. Physiology of Respiratory system, Tests and Instrumentation for the mechanics of breathing, Gas Exchange and distribution, Respiratory therapy Equipment.

UNIT-III


UNIT-IV

NERVOUS SYSTEM AND ITS MEASUREMENTS: Nervous system: Neuronal communication organization of the brain, Neuronal receptors, and somatic nervous system, Implemented from year 2014-15

UNIT-V


UNIT-VI


TEXT BOOK


REFERENCE BOOKS


Implemented from year 2014-15
COURSE DESCRIPTION:
Image processing is offered as the open elective course at the seventh semester of Electronics & Telecommunication Engineering undergraduate program. This course aims to give a broad background into techniques used in image processing and introduce the principles of image processing analysis.
The topics covered include image transforms, image enhancement and filtering in spatial and frequency domains, image segmentation. The course will also support allied subjects like signal processing and communications, aiming to show that the underlying nature of the subject is an ability to process two-dimensional signals though these are usually provided as images. We will also aim to show how these techniques are manifest in practical application, by a developing codes using appropriate tool which also highlight how image techniques can be deployed to success.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Analyze general terminology of digital image processing.
2. Design and implement algorithms for digital image processing operations such as histogram equalization, enhancement, filtering, using MATLAB.
3. Apply & differentiate different masks used in spatial filters & analyze the effect on it using appropriate tool.
4. Explain & formulate different morphological image processing techniques and analyze the effect of it by applying different structuring elements.
5. Compare various techniques used in segmentation by applying different types of the mask on the image using appropriate tool.

Implemented from year 2014-15
PREREQUISITE: Nil

UNIT-I

UNIT-II

UNIT-III
IMAGE ENHANCEMENT IN FREQUENCY DOMAIN: Introduction to fourier transform and the frequency domain, Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

UNIT-IV
MORPHOLOGICAL IMAGE PROCESSING: Dilation & erosion, opening and closing operation, Hit- or –miss transformation. Basic morphological algorithms: Boundary extraction, region filling, thinning and thickening, skeletons.

UNIT-V
IMAGE SEGMENTATION: Detection of discontinuities: Point detection, line detection, edge detection, Sobel, Prewitt, Laplacian mask for edge detection, Thresholding, Role of illumination, global and adaptive thresholding, Region based segmentation: region growing, region splitting and merging.

Implemented from year 2014-15
COLOR IMAGE PROCESSING: Color fundamentals, Color models, Pseudocolor image processing, Basics of full color image processing, Color transformations, Smoothing and sharpening, Color Segmentation.

TEXT BOOKS:

REFERENCE BOOKS
COURSE DESCRIPTION:
Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. Such constraints make the design and operation of sensor networks considerably different from contemporary wireless networks and demand the development of resource protocols and management techniques. This course provides a broad coverage of challenges and latest wide range applications to the design and management of wireless sensor networks. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Identify infrastructure components of sensor network
2. Explain the different applications of the WSN
3. Describe hardware and software components of WSN
4. Analyze and describe requirement of MAC Protocol in WSN
5. Design small sensor nodes

PREREQUISITE: Nil

UNIT-I

UNIT-II
Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring.

UNIT-III
6

UNIT-IV
6

UNIT-V
6

UNIT-VI
6

REFERENCE BOOKS

Implemented from year 2014-15
B. TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC451 ADVANCED COMMUNICATION LAB

COURSE DESCRIPTION:
This LAB deals with existing developments in telecommunication and video Engineering. The Lab deals with both the fundamental workings of analog and digital Televisions.
In this course, a curriculum model including recent developments and technologies in the Radio Frequency (RF) and Microwave Engineering field by using a blended approach is proposed. This study covers the description of the content of theoretical and hands on applications, the integration model. The main goal of the course is to prepare students for future professional careers in RF and Microwave Engineering by supporting them with new instructional technologies. The course is structured with a balance between theory and laboratory.

COURSE OUTCOMES:
After successful completion of this course, students should be able to
1. Examine & interpret the color Television Receiver and digital Television Receiver.
2. Set up & test signal strength of CCTV systems.
3. Illustrate operation of microwave sources, description of components and guide lines to operate microwave instruments.
4. Measure various microwave parameters.
5. Design microwave circuit using microwave components.

Implemented from year 2014-15

Credits

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LIST OF EXPERIMENTS:

1. Voltage and Waveform analysis for color TV.
2. Alignment and fault finding for color TV.
3. Study and design of wireless CCTV.
4. Practical visit to TV transmitter/Digital TV Studio
5. Study of HDTV
6. Study of digital TV.
7. Simulation of rectangular and circular waveguide in CAD FEKO.
8. Study of Reflex Klystron and its characteristics
9. Determine the frequency and wavelength in rectangular waveguide working on TE10 mode.
10. Measure the unknown impedance using slotted section and smith chart.
11. Understand working of Multi-hole directional coupler, Magic Tee.
12. Study of Gun oscillator and its characteristics.

Implemented from year 2014-15
Rajarambapu Institute of Technology, Rajaramnagar.
(An Autonomous Institute)

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC453 POWER ELECTRONICS LAB

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**COURSE DESCRIPTION:**
This course focuses on the measurement of the performance parameters of the converters by performing the experiments like single phase half controlled and full controlled rectifiers, dc-dc converters and inverters. Also it includes analysis of the parameters of the converters that helps enhancing analytical abilities of the students.

**COURSE OUTCOMES:**
After completion of this course students will be able to:

1. Build the circuit as per the requirement.
2. Predict response of the circuit for various conditions.
3. Find performance parameters.
4. Interpret the results and conclude.
5. Prepare the report of the experiment.

**PRE-REQUISITES:** Nil

**LIST OF EXPERIMENTS:**
1. V-I characteristic of SCR.
2. Triggering circuit using UJT.
3. SCR commutation circuit.
4. AC phase control using TRIAC.
5. Single phase full converter.
6. Three phase semi converter.
7. Step-down dc-dc converter.
10. DC motor control.

Implemented from year 2014-15
COURSE DESCRIPTION:
This laboratory will provide the students a perfect introduction to the Embedded System design and to provide hands-on experience essential to the real understanding of embedded controller architecture and it’s interfacing to the peripheral devices. The experiments are designed to provide the students with the design principles of ARM Embedded systems and real time programming. The course accomplishes this by using ARM controller boards, simulators and software development systems.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Provide experience designing embedded systems using Computer Aided Design (CAD) Tools i.e. Keil Compiler IDE
2. Demonstrate & writing Assembly language programs, Programs to be carried on ARM Teaching Kit based on LPC214X Processor with Keil Compiler IDE
3. Demonstrate & Writing C programs to interface ARM chip to Interfacing modules to develop solutions using Keil Compiler IDE.
4. Document and present design solutions in a team environment.
5. Design and implement software solutions to a high standard

PRE-REQUISITES:
The students should have an understanding of Microprocessor, Microcontrollers & Digital signal processing.

Implemented from year 2014-15
LIST OF EXPERIMENTS:

ASM Programs using Keil Micro vision 4 tool & Assembler directives
1. Identify different Data load, Data process ways of LPC213X and LPC214X ARM Microcontroller. Create Processes using different addressing modes & develop Programs (.ASM) to implement.
2. Identify different Addressing modes of LPC213X and LPC214X ARM Microcontroller. Create Processes using different addressing modes & develop Programs (.ASM) to implement.
3. Identify different stack related Addressing modes of LPC213X and LPC214X ARM Microcontroller. Create Processes using different addressing modes & develop Programs (.ASM) to implement.

C Programs using Keil Micro vision 4 tool & Compiler directives & Simulations
2. Design, simulate & implement ARM GPIO data transfer process. Develop ‘C’ Programs to demonstrate.
3. Design, simulate, analyse & implement timer/counter Process in LPC213X and LPC214X. Develop ‘C’ Programs to demonstrate
4. Develop program to implement ISR in Assembly and ‘C’.

C Programs using Keil Micro vision 4 tool & Compiler directives, Simulations & ARM Boards
1. Develop programs to blink LEDs using LPC213X or LPC214X.
2. Develop programs to interface relays to LPC213X or LPC214X.
3. Develop programs to interface Stepper Motor LPC213X or LPC214X.
4. Develop programs to generate PWM outputs using LPC213X or LPC214X.
4. Develop programs to interface 7 segment displays to LPC213X or LPC214X using I2C bus.

Case Study
1. Implement real time OS (WinCE6 and Linux) on ARM9 S3C2440A.

Implemented from year 2014-15
Rajarambapu Institute of Technology, Rajaramnagar.
(An Autonomous Institute)

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC457 INDUSTRIAL TRAINING/ CERTIFICATION COURSE

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The credits will be awarded on the basis of
1. Submission of certificate with report.
2. Demonstration of acquired skill by implementation of project / case study etc. as suggested by project guide.

Implemented from year 2014-15
COURSE DESCRIPTION:
The Final Year Project is a challenging capstone experience for Electronics & Telecommunication engineering students. The course builds upon the knowledge and skills that students have gained from previous coursework in their professional engineering degree. Professional working practice is learnt in the context of a realistic engineering problem where integrative aspects are emphasized. The aim is to provide a bridge from academic work to professional practice.

COURSE OUTCOMES:
After completion of this course students will be able to:

1) Exhibit the ability to formulate real time problem into mathematical or solvable model and develop creative, original solutions to engineering problems of significant complexity by using Electronics and Telecommunications.

2) Design, analyze the project and manage the time involved to complete the project by using latest technology and modern tools.

3) Demonstrate the ability to work in teams and also to recognize the need for and seek appropriate academic supervision to improve learning skills.

4) Consider ethical issues that might affect the study and design a methodology that addresses ethical requirements.

5) Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.

PRE-REQUISITES:
Students should have knowledge and skills that students have gained from previous coursework in their professional engineering degree.

Implemented from year 2014-15
RULES AND REGULATIONS OF PROJECT:

Project is a course requirement, wherein under the guidance of an Instructor, a final year student is required to do some innovative/contributory/developmental work with application of knowledge earned while undergoing various theory and laboratory courses in his/her course of study. A student has to exhibit both analytical and practical skills through the project work.

1. Every student has to undertake project of professional nature and interest at various levels of study. The topic of project may be related to theoretical analysis, an experimental investigation, a prototype design, a new concept, analysis of data, fabrication and setup of new equipment etc. The student shall be evaluated for his/her project through the quality of work carried out, the novelty in the concept, the report submitted and presentation(s) etc.

2. The project should be undertaken preferably by group of 3-4 students who will jointly work and implement the project in the two semesters.

3. A student has to carry out project under the guidance of a faculty from the same discipline unless specifically permitted by the Department Program Committees (DPCs) of the concerned departments in case of interdisciplinary projects or DPC of the parent department in case of industry sponsored projects.

4. The project is divided into two stages. The first stage shall be carried out in Semester-VII while the second stage shall be carried out in Semester-VIII.

5. The quantum of work expected to be carried out by a student in each stage shall be in accordance with the division of credits given in Project Evaluation Scheme.

6. Students are expected to avoid plagiarism during the project work to secure full credits.

7. All claims should be supported by valid references in the report.

8. The decisions taken by the examiners will be final.

9. The dissertation report (Synopsis, Project) is to be submitted in the prescribed format.

10. The Project report must be submitted by the prescribed date usually two weeks before the end of academic session of the semester.

Implemented from year 2014-15
# ASSESSMENT OF PROJECT:

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<tr>
<td>1.</td>
<td>Synopsis approval presentation</td>
<td>Panel of evaluators comprising guide &amp; two senior faculty members</td>
<td>ISE</td>
<td>August 1&lt;sup&gt;st&lt;/sup&gt; week</td>
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<td>2.</td>
<td>Demonstration of 25% project completion</td>
<td>Guide</td>
<td>ISE</td>
<td>September 3&lt;sup&gt;rd&lt;/sup&gt; week</td>
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<td>3.</td>
<td>Presentation &amp; Demonstration of 50% project completion</td>
<td>Panel of Examiners comprising of guide, external examiner &amp; chairman</td>
<td>ESE</td>
<td>November 2&lt;sup&gt;nd&lt;/sup&gt; week</td>
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Implemented from year 2014-15
Rajarambapu Institute of Technology, Rajaramnagar.  
(An Autonomous Institute)

B.TECH. ELECTRONICS & TELECOMMUNICATION  
B.TECH SEM-VIII  
EC402 ELECTRONICS PRODUCT DESIGN

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COURSE DESCRIPTION:

To cover product design & development, Stages and total coverage of product, Assessment by introducing the basics of Reliability and quality of electronic product.

COURSE OUTCOMES:

After completion of this course students will be able to:

1. Describe the concept of electronic product design, and the inter-relationship between different phases of an electronic product design cycle.
2. Explain the basic tools for electronic design.
3. Analyze the use of basic electronic components in designing electronic circuit.
4. Differentiate between analogue and digital electronics and apply them to circuit design.
5. Design an electronic product as per the specifications.

PRE-REQUISITES: There is no any prerequisite; however knowledge of analog and digital, hardware and software design will be beneficial.

UNIT-I


Implemented from year 2014-15

37/643
UNIT-II
HARDWARE DESIGNS- ANALOG: Analog Signal Conditioning- Factors affecting choice of OPAMPs in signal conditioning applications. Need for Instrumentation Amplifiers- Case study. Error budget analysis with Case study. ADCs- Interpretation of ADC specifications from design view point. Considerations in selecting References (Vref for ADC).DACs- Interpretation of DAC specifications from design view point.

UNIT-III
HARDWARE DESIGN- DIGITAL: Interface examples for- LED, HB LED, LCD, Keyboard, and Touch Screen. Microcontrollers - Comparative study of different Microcontroller Architectures, Factors affecting choice of Microcontroller for particular application with Case study of one application. Introduction to buses and protocols used in Electronic Products- I2C, SPI.

UNIT-IV
SOFTWARE DESIGN AND TESTING FOR ELECTRONIC PRODUCT: Different approaches to development of application software for Electronic Product. Factors affecting choice between Assembly language and High level language like C and C++. Documentation practices and templates for above software. Debugging tools and techniques for software- Features and limitations of- Debuggers, Simulators, ICE, and IDE. Hardware Test Programs.

UNIT-V
PCB DESIGN AND EMI/EMC: PCB Design practices for Analog and Mixed signal circuits- Ground Loops, Precision circuits, shielding and guarding. PCB Design Practices for High Speed Digital Circuits, Signal integrity and EMC. EMI/EMC testing standards and compliance.

UNIT-VI
DESIGN CONSIDERATIONS OF COMMUNICATION SYSTEMS: Implementing Radio link, Path profile, RF path loss calculations, Transmitter/Receiver sensitivity, Signal to Noise Ratio and SINAD, Fade Margin. Study and evaluation of Performance parameters like- Bit and

Implemented from year 2014-15
B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VIII
OE742 FUZZY LOGIC (OPEN ELECTIVE-II)

COURSE DESCRIPTION:
This course commences the exciting field of fuzzy systems. It deals with reasoning that is approximate rather than fixed and exact. Fuzzy logic is problem solving control system methodology. It introduces the fuzzy systems. It provides the skills to produce a fuzzy control system for a continuous process application.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Identify fuzzy sets and classical sets.
2. Relate fuzzy relations.
3. Interpret membership functions.
4. Plan knowledge base and rule base system.
5. Summarize fuzzy control applications.

PREREQUISITE: Nil

UNIT-I

UNIT-II
CLASSICAL RELATIONS & FUZZY RELATIONS: Cartesian product, crisp relations: cardinality, operations, properties, Fuzzy relations: cardinality, operations, properties, fuzzy Cartesian product & composition, tolerance & equivalence relations, fuzzy tolerance &

Implemented from year 2014-15
equivalence relations, value assignments: cosine amplitude, max-min method, other similarity methods.

UNIT-III
PROPERTIES & DEVELOPMENT OF MEMBERSHIP FUNCTIONS, FUZZIFICATION & DEFUZZIFICATION: Features of membership function, membership value assignments, various forms. fuzzification, defuzzification of crisp sets, \( \lambda \)-cuts for fuzzy relations, and defuzzification to scalars.

UNIT-IV
LOGIC & FUZZY SYSTEMS AND FUZZY ARITHMETIC & EXTENSION PRINCIPLE:

UNIT-V
FKBC DESIGN PARAMETERS: The structure of FKBC, rule base, data base, inference engine, choice of fuzzification procedure, choice of defuzzification procedure, Nonlinear fuzzy control: control problem. FKBC as a nonlinear transfer element, types of FKBC.

UNIT-VI
FUZZY CONTROL SYSTEMS: Control system design problem, aircraft landing control problem, fuzzy engineering process control, fuzzy statistical process control, industrial applications. Adaptive fuzzy control: design & performance evaluation, the main approach to design.

REFERENCE BOOKS:


Implemented from year 2014-15
COURSE DESCRIPTION:
Observing the need of Robotics in almost all domains and with the intention of sharing the basics of robotics to all branch students the course has been introduce as institutional elective. The objective of this course is to introduce students to the basic concepts of a microcontroller and how the intelligence factor can be put in to the robot.
All the units except first are taught with taking an advance Firebird V robot with ATMEGA 2560 microcontroller. At the same time the corresponding contents related to robot can be demonstrated by successfully dumping the code in robot. Firebird V is an advance robot made by NEX Robotics, Mumbai Pvt Ltd. There are no specific books available in market but along with robots with got software manuals.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Illustrate the basics related to PIC based robot architecture.
2. Interpret in detail the architecture, components and technical spec of Fire Bird V ATMEGA2560 Robot.
3. Analyze PIC Based Control Using Serial Communication.
5. Program the Fire Bird V ATMEGA2560 Robot with different interfacing units.

PRE-REQUISITES:
To study this course there are no prerequisites; however knowledge of following will be beneficial.
- Programming Language Knowledge
- Basic Electronics

Implemented from year 2014-15
UNIT-I


UNIT-II


UNIT-III

PC BASED CONTROL USING SERIAL COMMUNICATION: Communication protocol for simple robot control, Robot control using RS232 serial port, Robot control using USB port, Robot control using XBee wireless communication module, Robot Control using ‘GUI’ for Fire Bird V ATMega2560, Errata

UNIT-IV


UNIT-V

INTERFACING PROGRAMS ON FIRE BIRD V ATMega2560: Timer / Counter Operations on the Robot, LCD Interfacing, Analog to Digital Conversion, Serial Communication, SPI Communication.

Implemented from year 2014-15
UNIT-VI

ADVANCED PROGRAMMING CONCEPTS OF FIRE BIRD V ATMEGA2560: USB Communication Wired RS232 (serial) communication, Wireless ZigBee Communication (2.4GHZ) (if XBee wireless module is installed), Wi-Fi communication (if Wi-Fi module is installed), Bluetooth communication (if Bluetooth wireless module is installed), Simplex infrared communication (From infrared remote to robot).

TEXT BOOK:
1. PIC Robotics A Beginner’s Guide to Robotics Projects Using the PIC microcontroller

REFERENCE BOOK:
2. Fire Bird V ATMEGA2560 Software Manual V1.00 15-08-20122012-.pdf

Implemented from year 2014-15
COURSE OUTCOMES:
At the end of the course the students will be able to
1. Understand the product design and development process
2. Apply creative thinking skills for idea generation
3. Translate conceptual ideas into clear sketches
4. Design & analyze given circuit.
5. Present ideas using IT application software and physical model

LIST OF EXPERIMENTS:
Use MATLAB/LABVIEW/PSPIE/multisim
1. Power supply sizing (Estimation of current requirement)
2. Design of SPAN ZERO circuit
3. Error budget analysis
4. ADC Interface
5. DAC interface
6. Interfaces- LED, LCD, Touch Screen
7. Case study for deciding appropriate Microcontroller for given application
8. PCB Design for Mixed Signal Circuit (Involving ADC and Signal Conditioning)
9. DC analysis of given circuit
10. AC analysis of given circuit
11. Sensitivity analysis for given circuit
12. Reliability calculations for given circuit from given data
13. Case study of CDMA and OFDM
14. Digital Phase-locked loop
15. Equalizer
16. Interleaver 7

Implemented from year 2014-15
Rajarambapu Institute of Technology, Rajaramnagar.
(An Autonomous Institute)

B. TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VIII
EC454 COMPUTER COMMUNICATION AND NETWORK LAB

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COURSE DESCRIPTION:
Computer Communication Network lab is offered at the eighth semester of Electronics & Telecommunication branch of engineering undergraduate program consists of minimum 10 experiments.
This involves programming which is developed using Bioscom function of 'C' language. The various algorithms related to networking such as different transmission modes, bit stuffing, error detection and correction, stop and wait protocol can be done through 'C' programming.

COURSE OUTCOMES:
After completion of this course students will be able to:

2. Develop program for data transmission using different transmission modes.
3. Construct code for various error correcting and detecting techniques.
4. Analyze role of various protocols used in data transmission.
5. Estimate shortest path between nodes.

PREREQUISITE:
The prerequisite for this lab is knowledge of 'C' programming language.

Implemented from year 2014-15
LIST OF EXPERIMENTS:

1. Study of RS-232
2. Simplex and Half duplex protocol
3. Full duplex protocol
4. File Transfer
5. Bit stuffing algorithm
6. Error detecting and correcting code- Hamming code (Transmitter)
7. Error detecting and correcting code- Hamming code (Receiver)
8. Shortest path algorithm
9. Stop and wait protocol
10. Go Back N Protocol

Implemented from year 2014-15
COURSE DESCRIPTION:
The Final Year Project is a challenging capstone experience for Electronics & Telecommunication engineering students as they complete their four year honors degree. The course builds upon the knowledge and skills that students have gained from previous coursework in their professional engineering degree. Professional working practice is learnt in the context of a realistic engineering problem where integrative aspects are emphasized. The aim is to provide a bridge from academic work to professional practice.

COURSE OUTCOMES:
After completion of this course students will be able to:

1) Exhibit the ability to formulate real time problem into mathematical or solvable model and develop creative, original solutions to engineering problems of significant complexity by using Electronics and Telecommunications.

2) Translate work done in each phase of the project into authenticated (verifiable/accountable) reports.

3) Demonstrate the ability to work in teams and also to recognize the need for and seek appropriate academic supervision to improve learning skills.

4) Consider ethical issues that might affect the study and design a methodology that addresses ethical requirements.

5) Transform the theoretical and practical knowledge acquired into useful products which will ease the human efforts.

PRE-REQUISITES:
Students should have knowledge and skills that students have gained from previous coursework in their professional engineering degree.

Implemented from year 2014-15
ELECTIVE LIST

Program Elective-I List: -

1. Satellite Communication (EC409)
2. Biomedical Instrumentation (EC411)
3. Optical Network (EC413)
4. Programmable System On Chip (EC415)

Program Elective-II List: -

1. Embedded System Design using MSP430 (EC408)
2. Computer Architecture (EC410)
3. Programmable logic controllers (EC412)

List of Open Electives offered at Institute level for B.Tech Programme
Semester VII

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<td>Mechanical</td>
<td>Product Design and Development</td>
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B.TECH. ELECTRONICS & TELECOMMUNICATION
FOURTH YEAR SEM-VII
EC413 OPTICAL NETWORK
(PROGRAM ELECTIVE I)

COURSE DESCRIPTION:
This course presents the state-of-the-art in the field of "Optical communication networks" which encompasses traditional networks operating on optical fiber as well as the next-generation networks. The course will provide students a fundamental understanding of optical network design, control, and management.

PREREQUISITE: Students should have knowledge of Basics of Optical Communication.

COURSE OUTCOMES:
After completion of this course students will be able to:

1. Describe various elements of optical networks and transmission system.
2. Solve technical problems in Optical network architectures and optical transport networks;
3. Analyze the need and methods optical networks, architectures and access techniques.
5. Design optical transmission system and optical networks.

UNIT I
INTRODUCTION: Services, Circuit Switching, Packet Switching, Optical Networks, Optical Layer, Transparency and All Optical Networks, Optical Packet Switching, Transmission Basics, Network Evolution.
UNIT II

OPTICAL AMPLIFIERS: Stimulated Emission, Spontaneous Emission, Erbium Doped Fiber amplifiers, Raman amplifiers, Semiconductor Optical Amplifiers, Cross talk in SOAs.

UNIT III


UNIT IV


UNIT V


UNIT VI

ACCESS NETWORKS: Network Architecture Overview, Enhanced HFC, fiber to the Curb (FTTC).
TEXT BOOKS:

REFERENCES
1. Introduction to Optical Fiber Communication Systems-William B. Jones HRW.
B.TECH. ELECTRONICS & TELECOMMUNICATION
FOURTH YEAR SEM-VII
EC415 PROGRAMMABLE SYSTEM ON CHIP
(PROGRAM ELECTIVE-I)

COURSE DESCRIPTION:
PSoC is the world's only programmable embedded system-on-chip integrating high-performance analog, PLD-based programmable logic, memory and a microcontroller on a single chip. Programmable system-on-chip (PSoC), which provides a microprocessor, microcontroller and programmable analog and digital secondary functions in a particular chip, is very suitable for mixed-signal electronic organism intend. Goal. This course focuses on the development of mixed-signal embedded applications that utilize Systems On Chip (SoC) technology.

COURSE OUTCOMES:
After completion of this course students will be able to:
1. Infer advanced functionality and interfacing capabilities
2. Devise performance through programming the embedded microcontroller and customizing the reconfigurable analog and digital hardware of the SoC.
3. Develop in-depth "systems" skills that will serve them well throughout their career.
4. Apply combination of analog and digital modules, as well as, writing software drivers for interfacing new devices.
5. Employ architecture customization for implementing new functionality and obtaining better performance.

UNIT I
INTRODUCTION TO PSOC
PSoC technology, programmable routing and interconnect, configurable analog and digital blocks, cpu sub system, families of PSOC (PSoC 1, PSoC 3, PSoC 5), difference between PSoC and conventional MCU.
UNIT II
INTRODUCTION TO PSOC 3/5
PSoC 3/5, architecture - block diagram, system wide resources, I/O interfaces, CPU sub system, memory organization, digital sub systems, analog sub systems

UNIT III
PSOC DESIGN MODULES
Why cypress PSoC, structure of PSoC, PSoC designer suit, limitations of PSoC, improvements, of the PSoC, PSoC sub system design, PSoC memory management.

UNIT IV
MIXED-SIGNAL EMBEDDED DESIGN
Overview of mixed-signal embedded system design, hardware and software subsystems of mixed-signal architecture, PSoC hardware components, PSoC software components, PSoC interrupt sub system, introduction to PSoC express, system design using PSoC express.

UNIT V
PSOC COMPONENTS
Universal digital blocks (UDB), UDB arrays and digital system interconnect (DSI), timer, counter and PWM, digital filter blocks (DFB), ΔΣ ADC topologies and circuits, programmable gain amplifiers, switched capacitor / continuous time, analog routing, flash temperature sensors, DTMF dialers, sleep timers, UART, I2 C, SPI, USB, CAN buses.

UNIT VI
SYSTEM DESIGN USING PSOC
Interfacing of temperature sensors and tachometers SPI and UART based task communications, lower noise continuous time signal processing with PSoC, data acquisition and control system with PSoC, ultra wide-based RADAR, serial bit receiver with hardware Manchester decoder, DTMF detector, ultrasonic vehicle parking assistant, universal wide range signal generator.
Text Books:
1. PSoC 3, PSoC 5 Architecture technical reference manual, Cypress website
3. Introduction to mixed signal Embedded design – Van Ess, Curie and Daboli Cypress lab Manual.

Reference Books:
2. Introduction to Mixed Signal Embedded Design, Alex Doboli, Springer
4. PSoC Mikrocontroller by Fredi Kruger Franzis, 2006

Web References:
1. www.cypress.com/go/psoc
2. www.cypress.com/go/traing
3. www.cypress.com/go/support
4. www.psocdeveloper.com