Department of Electronics and Telecommunication Engineering

M. Tech Electronics Engineering

K. E. Society's

Rajarambapu Institute of Technology,

Rajaramnagar, Islampur

(An Autonomous Institute Affiliated to Shivaji University, Kolhapur)

2017-18

FIRST YEAR M. TECH ELECTRONICS ENGINEERING
SYLLABUS STRUCTURE
SEMESTER I

Course Code	Course	Teaching Scheme				Evaluation Scheme					
							Theory (Marks) %			Practical (Marks) %	
		L	T	P	Credits	Scheme	Max	Min % for Passing		Max	Min % for Passing
EDS1013	Embedded System Design	3	1	--	4	ISE	20	40	40	--	--
						UT1	15			--	--
						UT2	15				
						ESE	50	40		--	--
ECS1013	Automatic Control System	3	1	--	4	ISE	20	40	40	--	--
						UT1	15			--	--
						UT2	15				
						ESE	50	40		--	--
ECS1023	Advanced Digital Signal Processing	3	1	--	4	ISE	20	40	40	--	--
						UT1	15			--	--
						UT2	15				
						ESE	50	40		--	--
ECS1033	Research Methodology	1	--	2	2	ISE	--	--	--	50	50
						ESE	--	--		50	50
ECS1043	Programming Fundamentals	--	1	4	3	ISE	--	--	--	100	50
SHP551	Technical Communication	1		2	2	ISE	--	--	--	100	50
EDS1033	Embedded System Design Lab	--	--	2	1	ISE	--	--	--	50	50
						ESE	--	--		50	50
ECS1053	Automatic Control System Lab	--	--	2	1	ISE	--	--	--	50	50
						ESE	--	--	--	50	50
ECS1063	Advanced Digital Signal Processing Lab	--	--	2	1	ISE	--	--	--	50	50
						ESE	--	--	--	50	50
ECS1073	Seminar	--	--	2	2	ISE	--	--	--	100	50

Total Credits: 24, Total Contact Hours/Week: 30

***Audit course**

RIT-MT-LL	Liberal learning	--	--	--	--	P/F	Certificate issued by competent authority

The course to be completed within span of two years as per guidelines given in the curriculum

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SYLLABUS STRUCTURE

SEMESTER II

Course Code	Course		Teaching Scheme				Evaluation Scheme				
			L	T	P	Credits	Scheme	Theory (Marks) %		Practical (Marks) %	
								Max	Min % for Passing	Max	Min % for Passing
SHP516	Advanced Mathematics Engineering		2	--	--	2	ISE	20	40	--	--
							UT	30		--	--
							ESE	50	40	--	--
ECS2013	Radio Frequency Engineering		3	1	--	4	ISE	20	40	--	--
							UT1	15		--	--
							UT2	15		--	--
							ESE	50	40	--	--
Elective I	EDS2023	Protocol and interfaces	3	1	--	4	ISE	20	40	--	--
							UT1	15		--	--
	ECS2023	Mobile Communication Technology					UT2	15		--	--
							ESE	50	40	--	--
Elective II	EDS2043	Embedded OS & Device Drivers	3	1	--	4	ISE	20	40	--	--
							UT1	15		--	--
	ECS2033	Mobile Adhoc Network					UT2	15		--	--
							ESE	50	40	--	--
Elective III	EDS2063	Mobile Application Development	3	--	--	3	ISE	20	40	--	--
							UT1	15		--	--
	ECS2043	Security In Mobile And Wireless Systems					UT2	15		--	--
							ESE	50	40	--	--
EDS2083	Soft computing		3	--	--	3	ISE	20	40	--	--
							UT1	15		--	--
							UT2	15		--	--
							ESE	50	40	--	--
Elective Lab I	EDS2093	Embedded System Lab I	--	--	4	2	ISE	--	--	--	50	50
	ECS2053	Communication Lab I					ESE	--	--		50	50
Elective Lab II	EDS2113	Embedded System Lab II	--	--	4	2	ISE	--	--	--	50	50
	ECS2063	Communication Lab II					ESE	--	--		50	50
ECS2073	Miniproject		--	--	2	2	ISE	--	--		100	50

Total Credits: 26, Total Contact Hours/Week: 30

SECOND YEAR M. TECH ELECTRONICS ENGINEERING

SYLLABUS STRUCTURE

SEMESTER III

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS3013	Field Training/MOOC/ NPTEL/Coursera/Courses suggested by BOS	--	--	--	2	ISE	2	100	50
ECS3023	Dissertation Phase-I	--	--	--	4	ISE	4	100	50
ECS3033	Dissertation Phase-II	--	--	5	10	ISE	4	100	50
ECS3043						ESE	6	100	50

Total Credits: 16, Total Contact Hours/Week: 05

SECOND YEAR M. TECH ELECTRONICS ENGINEERING

SYLLABUS STRUCTURE

SEMESTER IV

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS4013	Dissertation Phase-III	--	--	--	08	ISE	8	100	50
ECS4023	Dissertation Phase-IV	--	--	5	10	ISE	4	100	50
ECS4033						ESE	6	100	50

Total Credits: 16, Total Contact Hours/Week: 05

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FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

EDS1013 EMBEDDED SYSTEM DESIGN

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

This course on Embedded System Design wills first the students to the fundamental requirements of embedded systems and the interaction between hardware and software in such systems. Next the course will discuss some basic steps of hardware design, introduce the students to ASIPs, ASICs and FPGAs. Next, the students will be exposed to the very important issue of designing for less power consumption and introduce them to the techniques that are adapted to this end. Since many of the embedded systems will have real time constraints, basic issues of real time operating systems will be discussed. This will be followed by formal specification models and languages, mapping the specification to hardware and software components along with decisions on design tradeoffs and hardware software partitioning. Next, synthesis if hardware and software along with a few of the optimization techniques will be presented. The course will end with a brief overview of design verification methods that are adopted for embedded system design.

PRE-REQUISITES:

Basic Knowledge of Microprocessor & Microcontroller based system design.

COURSE OUTCOMES:

After completion of this course, students will be able to:

- Comprehensive understanding of the system architectures involving hardware & software components as well as of its complex communication structures.
- Apply knowledge of various embedded processor architectures in industrial automation.
- Optimizing embedded software for speed and size for industrial applications
- Design, implement and test a single-processor embedded systems for real-time applications

UNIT-I 6

INTRODUCTION: Embedded Systems overview, Design challenge, Processor Technology, Design technology, Custom Single-Purpose Processor Design, RT-Level Custom Single-Purpose Processor Design Optimizing Custom Single-Purpose Processor Design.

UNIT-II 6

EMBEDDED SYSTEM HARDWARE: Introduction, Sensors & Signals, Analog to digital conversion & Digital-to analog conversion. Communication, Introduction to Intel Galileo & arduino UNO. arduino UNO Timer, Controller Design using Intel Galileo & arduino UNO. Embedded 'C' programming for Intel Galileo & arduino UNO Bit manipulations, addressing mechanism for memory mapped registers, Functions, Arrays, Pointers, structures and unions.

UNIT-III 6

EMBEDDED OPERATING SYSTEMS, MIDDLEWARE & SCHEDULING : Prediction of execution times, Power Aware Embedded System-I, Scheduling in Real Time Systems, Power Aware Embedded System-II, Compilers for embedded systems, Voltage scaling & Power Management, SD & DD Algorithms, Parallel Operations & VLIW, Code Efficiency, DSP application & Address Generation Unit, Introduction to Embedded Operating Systems

UNIT-IV 6

EMBEDDED OPERATING SYSTEMS: Introduction to Embedded Operating Systems-I, RMS Algorithm, EDF Algorithm & Resource constraint Issue, Priority Inversion & Priority Inheritance Protocol, Embedded Operating Systems-II-Linux

UNIT-V 6

STATE MACHINE AND CONCURRENT PROCESS MODELS : Introduction, Models Vs. languages, basic state machine Models, FSMD, HCFSM and the state charts language, PSM, Concurrent process Model, Communication among Processes, SDL, Synchronization among Processes, Dataflow Model,

UNIT-VI 6

HARDWARE SYNTHESIS: Task level concurrency Management, High level optimizations- Floating point to fix point conversions, Simple loop transformations, Loop blocking, Loop Splitting, Array folding, Hardware- software partitioning, Simulation & formal verification.

TEXT BOOK

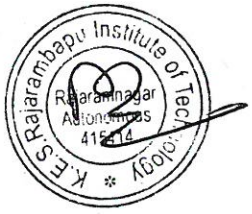
- Embedded System Design A unified Hardware/Software Introduction By Frank Vahid / Tony Givargis WILEY Publications 2006
- Embedded System Design By Peter Marwedel Springer publication 2006

REFERENCE BOOKS

- NPTEL on line course on "Embedded System Design" By Prof. Anup Basu, IIT kharagpur

TECHNICAL WEBSITES EMBEDDED:

- https://www.youtube.com/watch?v=Cus_NaKWmGo
- https://www.youtube.com/watch?v=-9LfgiV1AKs
- https://www.youtube.com/watch?v=ysUXi8RyLAA



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1013 AUTOMATIC CONTROL SYSTEM

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

Automatic Control System is being used in almost all the industry verticals today. It introduces fundamental Concepts, Principles and applications of automatic control system analysis and design to the postgraduate students. The detailed study of Sensors, Processes, Control Principles and Controllers is included in this course.

COURSE OUTCOMES:

After completion of this course students will be able to:

- Explain the basic building blocks of the process control, sensors and controllers.
- Design Analog and Digital signal processing and conditioning circuits.
- Analyze different automatic control systems and applications.

PREREQUISITE:

Fundamental Knowledge of Analog Circuits, Digital Electronics and Control Systems.

UNIT-I **6**

INTRODUCTION TO PROCESS CONTROL: Introduction, Control Systems, Process Control Block Diagram, Control System Evaluation, Analog and Digital signal Processing, Analog and Digital Signal Conditioning.

UNIT-II **6**

SENSORS: RTDs, Thermistors, Thermocouples, other thermal sensors, Displacement, Location or Position Sensors, Strain Sensors, Motion Sensors, Pressure sensors, Flow Sensors, Smart Sensors

UNIT-III 6

CONTROLLER PRINCIPLES: Process Characteristics, Control System Parameters, Discontinuous Controller Modes, Continuous Controller Modes, Composite Control Modes,

UNIT-IV 6

DISCRETE STATE PROCESS CONTROL: Characteristics of the system, Relay controllers and Ladder Diagrams, Programmable Logic Controllers (PLCs),

UNIT- V 6

ANALOG CONTROLLERS AND COMPUTER BASED CONTROL: Electronic Controllers, Pneumatic Controllers, Computer Based Controller, Other computer applications, Control System Networks

UNIT-VI 6

CONTROL LOOP CHARACTERISTICS: Control System Configurations, Multivariable Control System, Control system quality, Stability, Process loop tuning

TEXT BOOKS:

- Curtis D. Johnson, Process Control Instrumentation Technology, Pearson New International edition. 8th edition 2005.

REFERENCE BOOKS:

- Norman S. Nise, Control Systems Engineering, John Wiley & Sons, 5th edition 2008
- G. Stephanopoulos: "Chemical process control – An introduction to Theory & Practice", Prentice Hall of India Ltd, New Delhi.2005
- Lingefeng Wang, Kay Chen Tan,"Modern Industrial Automation and Software Design" John Wiley & Sons Inc.2006

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1023 ADVANCED DIGITAL SIGNAL PROCESSING

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

Advances in integrated circuit technology have had a major impact on the technical areas to which digital signal processing techniques and hardware are being applied. The efficient use of such hardware devices requires thorough understanding of various digital signal processing techniques. These techniques encompass filter design methods, power spectrum estimation and sampling rate conversion. The subject is essential for anyone whose work is concerned with signal processing applications.

COURSEOUTCOMES:

After successful completion of this course students should be able to;

- Explain techniques available for implementation of digital signal processing system
- Design and simulate the working of given digital signal processing system
- Evaluate performance of digital signal processing system
- Interpret the performance of digital signal processing system
- Write limitations of digital signal processing system designed with specific technique.

PREREQUISITE:

Students should have knowledge of signals & systems & digital signal processing.

UNIT I **06**

LINEAR PHASE FIR FILTER: Properties of FIR filter, window design technique, FIR filter design by frequency sampling method, Optimum equiripple linear phase FIR filters, FIR differentiator, Hilbert transformers, Comparison of design methods for linear phase FIR filters

UNIT II **06**

POWER SPECTRUM ESTIMATION: Estimation of spectra from finite duration observation of signals; Computation of energy density function, Estimation of auto-correlation and power spectrum of random signals; the period gram. The use of the DFT in power spectrum estimation, Parametric methods for power spectrum estimation: ARMA, AR, MA

UNIT III **06**

OPTIMAL FILTERS: Autocorrelation, cross correlation, applications of optimal filters, problem statement of optimal filter, signal models, Signal modelling: Pade approximation, Prony's method, Shank's method, Inverse filter

UNIT IV **06**

LINEAR PREDICTION: Forward and backward linear prediction, The Levinson Durbin algorithm, The Schur algorithm

UNIT V **06**

ADAPTIVE FILTERS: Necessity, Adaptive filters as noise cancellers; Configuration of adaptive filters; main components of adaptive filters; Adaptive algorithms: LMS, RLS;

UNIT VI **06**

MULTIRATE DSP: Decimation by a factor of D, Interpolation by factor of I, sampling rate conversion by a rational factor I/D, filter design & Implementation of sampling rate conversion

REFERENCE BOOKS:

- Digital signal processing: - Principles, algorithms and application, John. G Proakis, D.G.

Manolakis, 4th edition, Pearson Education

- Statistical digital signal processing and modeling Monson. H. Hayes: Wiley Publication, 1st edition
- Digital signal processing, S.D.Apte, WILEY, 2nd edition
- Digital Signal Porcessing- A Matlab based approach,Vinay Ingle, J.G.Proakis-CENGAGE Learning-2nd edition.
- Introduction to digital signal processing, Johnny R Johnson, PRENTICE HALL OF INDIA, 1st edition
- Digital signal processing, A computer based approach, Sanjit K. Mitra (McGraw Hill- 3rd Edition)

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1033 RESEARCH METHODOLOGY

L	T	P	Credits
1	0	2	2

COURSE DESCRIPTION:

This course is designed for students pursuing the M. Tech Electronics PG programme. It is designed on the principles and concept of experimental design, data collected from such experiments and data analyses. The course will introduce students to the use of statistical methods.

PREREQUISITES: Nil

COURSE OUTCOMES:

After completion of the course, the students should be able to;

- Demonstrate the knowledge of research process
- Apply statistical methods for analyzing the data and interpret results
- Use research related software for analyzing the data

UNIT-I **03**

FORMULATING THE PROBLEM STATEMENT, LITERATURE REVIEW: Definitions and characteristics of research; Types of research, research process, Uses of literature review; Source of information; Organization of information; Ethical considerations, plagiarism check

UNIT-II **03**

RESEARCH METHODOLOGIES: Study population; Variables; Sampling; Sample size determination; Plan for data collection; Methods of data collection; Plan for data processing and analysis;

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UNIT-III 03

RESEARCH RELATED SOFTWARE AND STATISTICAL ANALYSIS: Data analysis software SPSS, Core calculation software, Latex. White smoke Diagrammatic and graphic presentation, statistical analysis, case study analysis

UNIT-IV 03

IPR AND REPORT WRITING: Introduction, Nature of Intellectual Property, Patents, Designs, Trademarks and Copyright. Process of Patenting and Development, Patent Rights, Structure of project report, Techniques of interpretation, Precautions of interpretation, case study presentation.

REFERENCES:

- Kothari C.K. (2004) 2/e, Research Methodoloy – Methods and Techniques (New Age International, New Delhi)
- Krishnswamy, K.N., Shivkumar, Appa Iyer and Mathiranjan M. (2006) Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
- Gautam, N. C. (2004) Development of Research tools, New Delhi, Shree Publishers.
- Gupta, Santosh (2005) Research Methodology and Statistical Techniques, Deep and Deep Publications.
- Brymann, Alan and Carmer, D. (1995) Qualitative data analysis for social scientist, Newyork, Routledge Publication.
- Taylor & Francis Ltd, "Resisting Intellectual Property by Halbert", 2007
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age"6th edition 2016
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand 3rd edition 2014

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1043 PROGRAMMING FUNDAMENTALS

L	T	P	Credits
0	1	4	3

COURSE DESCRIPTION:

This course aims to introduce programming and emphasis in problem solving on the fundamentals of structured design using the principles of Top Down problem solving strategy. This includes development, testing, implementation, documentation. The course aims to explore the logic of programming via the algorithm concepts

PRE-REQUISITES:

Basic C-language

COURSE OUTCOMES:

After completion of this course, students will be able to:

- Enumerate GNU tools used for developing C Language, its various data types and its representation.
- Analyze the control structures, pointers, and arrays in C and develop programs using them.
- Develop C applications using user defined functions and strings.
- Develop C applications using structures, unions and Pre-processors.
- Develop C applications which uses dynamic memory management and in line assembly.

UNIT-I **5**

FUNDAMENTALS: History of C and overview of standards (K&R, ANSI, C99, C1x, gnu extensions etc.) Development life cycle of a C program, GNU Tools required gcc, cpp, as, ld, nm, objdump etc. Layout of C executable (code, data, bss,stack,heap etc) Debugging C Programs using gdb. Representation of integral, floating values(2's compliment,IEEE 32 bit,64 bit

formats), Endianness Portability Issues, usage of Typedef, Register storage class, Volatile Variables

UNIT-II **7**

CONTROL STRUCTURES, POINTERS, ARRAYS, FUNCTIONS: Recap of control structures,Architecture dependent, independent optimizations Concept of pointers, NULL Pointer,Pointer arithmetic, void pointer, pointer to pointer, pointer to array, array of pointers, pointers and const keyword. Creation,Initialization of 1D,2D arrays, Accessing elements of 1D, 2D arrays using pointers as well as subscrip Oerators

UNIT-III **6**

FUNCTIONS, STRINGS: Scope and Lifetime of variables, Storage classes, Internal vs External linkage, Symbol lookup using nm, Passing arguments by value, address, Return mechanism, Inline Functions, Recursion vs Iteration, Tail Recursion,Function pointers, Callback functions String operations, library functions, implementing own logic,Table of strings-fixed length, variable length

UNIT-IV **5**

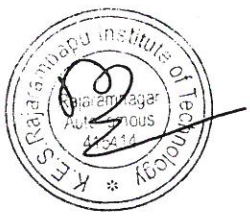
STRUCTURES & UNIONS, PREPROCESSOR : Symbolic constants, Macros, Conditional Compilations, Predefined Constants, Preprocessor operators, Structure Alignment,Packing Issues, Padding Bits, offset of members,Bit fields, Bit manipulations, Unions, Understanding memory layout of variables

UNIT-V **6**

MEMORY MANAGEMENT: Dynamic memory using malloc,calloc, realloc, free , allocating 1D,2D arrays fixed length,variable length rows

UNIT-VI **6**

MEMORY MANAGEMENT & ASSEMBLY: Analysis of memory leaks and heap errors using valgrind Inline assembly, Register allocation, Creation of static and dynamic libraries.



TEXT BOOK

- Embedded C Programming & the Microchip PIC 1st Edition by Richard H. Barnett, Larry O' Cull/ Delmar Cengage Learning 2004

LIST OF EXPERIMENTS: (WITH OPEN ENDED PROBLEMS)

- Implement user defined string function strlen, strcpy, strcmp, strcat, strrev with use of pointer.
- Write a c program to for addition, subtraction and multiplication of two matrix.
- Implement your own function for reading and printing string with multiple lines.
- Write a C program by using structure and string to demonstrate shallow copy, write appropriate solution to implement deep copy.
- Write a program to allocate dynamic memory to array of pointer to string, and initialize array elements with string dynamically.
- Convert the string in a.b.c.d format into 32 bit unsigned integer.

FIRST YEAR M. TECH. DIGITAL SYSTEMS ENGINEERING

SEM-I

SH551 TECHNICAL COMMUNICATION

L	T	P	Credits
1	0	2	2

COURSE LEARNING OUTCOMES:

After successful completion of the course student will be able to-

- Prepare documents those are structurally and technically appropriate.
- Demonstrate skills desired in job screening.
- Develop strategies for addressing multiple audiences for any given technical presentations.
- Demonstrate use of English as a language of academic and profession.

UNIT I 2

FORMAL WRITTEN COMMUNICATION: Resume Writing, e-Mails, Notices, Circulars, Memos.

UNIT II 2

WRITING PROJECT PROPOSAL: Essentials, Aim, Background & significance, Design & methods, Abstract.

UNIT III 2

REPORT WRITING: Types of reports (Seminar, Dissertation), Planning a report, Collection & organization of information.

UNIT IV 2

ORAL PRESENTATION OF REPORTS: Preparation, Understanding audience, Dos and Don'ts of Content Delivery, Handling questions and Feedback, Proofreading.

UNIT V

INTERVIEW SKILLS: Types, Dos and Don'ts, Answering FAQs. 2

UNIT VI

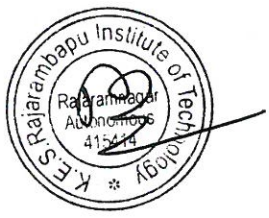
GROUP DISCUSSION: Structured and Unstructured GD, Opening and Closure, Showing Agreement and Disagreement. 2

LIST OF PRACTICALS/ASSIGNMENTS

- Goal Setting, SWOT Analysis, and Self Introduction (in the industry context)
- Listening activities: Listen and reproduce, Listen and respond; Exercises on Graduate Record Examination [GRE] Word List
- Resume writing and writing e-Mails
- Mock Interview
- Participation in a structured GD
- Writing a project proposal
- Writing various parts of a report
- Proofreading a sample report
- Preparing PPT Presentation
- Demo presentations by students and handling questions and feedback

REFERENCE BOOKS:

- John Seely, Oxford Guide to Effective Writing and Speaking; Oxford University Press, 2009.
- Thomas N. Huckin and Leslie A. Olsen, Technical Writing and Professional Communication for Nonnative Speakers of English; Tata McGraw Hills, International Edition, 1991.
- Jeff Butterfield, Soft Skills for Everyone, Cengage Learning India Private Limited, 2010.



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

EDS1033 EMBEDDED SYSTEM DESIGN LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION:

This course will cover the basics of embedded system organization and real-time systems. It provides the advance knowledge required for embedded computer design and development as well as real-time operating systems. Students are introduced to software development concepts applicable to real-time embedded systems. Particularly Intel Galileo & Ardiuno will be studied as a embedded processor and embedded software development is carried out for above CPUs. The students will be able to grasp the main principles of embedded system design and understand the RTOS concepts and scheduling techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

- Summarize the features and structures of practical implementation of real- time operating system Linux.
- Explain the need for real-time operating systems.
- Identify the different real-time operating systems.
- Review & implement the protocols used by controllers to communicate with external sensors & actuators in real world.

PREREQUISITE:

The prerequisite for this course is fundamental understanding of operating systems & a working knowledge in C.

LIST OF EXPERIMENTS:

Programming with the Intel Galileo Gen2 board & arduino UNO. Design & Development of IOT application using Intel based Galileo Gen2 board, A Practical Approach (Experimental Manual for M. Tech Students) For Embedded System Design. In association with Intel Collaboration Program.

- To familiarize with Intel Galileo Gen2 board and understand the procedure of creation and compilation of C source code.
- To write C source code to Interface LCD with Intel Galileo Gen 2 and display IGDTUW on LCD Display.
- To write C source code to Interface Temperature Sensor(LM35) with Intel Galileo Gen 2 and display the temperature on LCD.
- To write C source code to Interface Temperature Sensor (LM35), Piezo Buzzer & LCD Display with Intel Galileo Gen 2.
- To write C source code to Interface Sound Detector with Intel Galileo Gen 2.
- To write C source code to Interface Bluetooth Module with Intel Galileo Gen 2 and showing communication between Galileo Gen2 & Android Device.
- To write C source code to Interface Bluetooth module and Temperature sensor with Intel Galileo gen 2 and display temperature values from serial monitor to mobile device.
- To Implement A Motion Alarm Circuit Using Intel Galileo Gen2 Board Using Motion Sensor And Buzzer.
- To write C source code to Interface Temperature Sensor & 12V DC fan with Intel Galileo Gen 2.
- To write C source code to Perform Alcohol Gas Sensor Interfacing With Intel Galileo Gen2 Board.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1053 AUTOMATIC CONTROL SYSTEM LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION:

Automatic Control System is being used in almost all the industry verticals today. It introduces fundamental Concepts, Principles and applications of automatic control system analysis and design to the postgraduate students

COURSE OUTCOMES:

After completion of this course students will be able to:

- Design signal conditioning circuits for different applications.
- Apply principles of P, PI, PID controllers.
- Analyze different analog and digital control methods.

EXPERIMENTS:

- Study of signal conditioning circuits for different applications.
- Study of On- Off Controller
- Study of P,PI, PID Controller
- Lab-View based PI Controller for a Level Control System
- Lab-View based temperature control system.
- Implement water level controller using PLC.
- Implement traffic light controller using PLC.
- Implement conveyor controller using PLC.
- Implement lift controller using PLC.
- A mini Project related to digital control application

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1063 ADVANCED DIGITAL SIGNAL PROCESSING LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION:

Advances in integrated circuit technology have had a major impact on the technical areas to which digital signal processing techniques and hardware are being applied. The efficient use of such hardware devices requires thorough understanding of various digital signal processing techniques. These techniques encompass filter design methods, sampling rate conversion and power spectrum estimation. The subject is essential for anyone whose work is concerned with signal processing applications

COURSEOUTCOMES:

After completion of this course students will be able to:

- Design and simulate the working of given digital signal processing system
- Evaluate performance of digital signal processing system
- Interpret the performance of digital signal processing system
- Present and Write laboratory reports in desired format in grammatically correct language
- Write limitations of digital signal processing system designed with specific technique

PREREQUISITE:

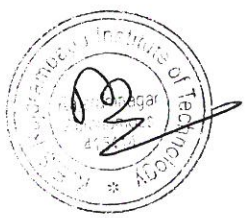
Students should have knowledge of MATLAB programming.

PRACTICAL LIST:

Student should perform minimum 10 experiments

- Design and implementation of window based filters
- Design and implementation of filters using frequency sampling

- Design and implementation of equiripple filters
- Signal modeling using Pade approximation
- Signal modeling using Prony's method
- Signal modeling using Shank's method
- Design and implementation of forward predictor
- Design and implementation of backward predictor
- Design and implementation of Interpolator
- Design and implementation of Decimator
- Design and implementation of sampling rate converter by arbitrary factor
- Estimate spectrum of given signal
- Implementation of adaptive filters



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

ECS1073 SEMINAR

L	T	P	Credits
0	0	2	2

COURSEOUTCOMES:

After completion of this course students will be able to:

- Acquire in-depth knowledge of selected area
- Carry out literature review of relevant material
- Perform critical analysis and synthesis of collected information
- Present seminar in logical order
- Write a seminar report in desired format

The credits will be based on the delivery of the seminars on the advanced and emerging fields of Electronics engineering.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-I

COMMON TO ALL M.TECH PROGRAMS

RIT-MT-LL: LIBERAL LEARNING

L	T	P	Audit	Evaluation Scheme
-	-	-	P/F	Certificate issued by competent authority

COURSE DESCRIPTION:

The liberal learning course is introduced to provide knowledge, skills and experiences to the MTECH students that will ensure their success in professional and personal life. The liberal learning course will deepen their understanding of the world and society, help them to look at things from different perspectives and develop them as good human being.

This Course is being introduced as a self study (or online certification course) and is an Audit course. It is expected that students should complete the course within span of two years, before submission of dissertation thesis.

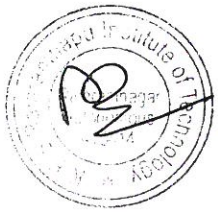
COURSEOUTCOMES:

After completion of this course students will be able to:

- To enhance intellectual and scholarly growth of students
- To create awareness of social responsibility among students
- To provide strong foundation for life-long learning
- To integrate engineering and liberal arts to compete in a highly competitive and technology based global economy

SOME OF THE AREAS OF LIBERAL LEARNING (NOT LIMITED TO) ARE LISTED FOR REFERENCE:

- **Agriculture** (Landscaping, Farming, etc.)
- **Humanities and social sciences** (Literature, Applied linguistics etc)



- **Management** (marketing research & analysis, Gender justice, corporate social responsibility etc.)
- **Business** (Management, Entrepreneurship, etc.)
- **Defense** (Study about functioning of Armed Forces)
- **Education** (Education system, Policies, Importance, etc.)
- **Fine Arts** (Painting, Sculpting, Sketching, etc.)
- **Medicine and Health** (Diseases, Remedies, Nutrition, Dietetics, etc.)
- **Performing Arts** (Music, Dance, Instruments, Drama, etc.)
- **Social Sciences** (History, Political Sc., Archeology, Geography, Civics, Economics, NSS activities etc.)
- **Biological sciences and Biotechnology** (Animal physiology, Forest biometry etc)
- **Chemistry and biochemistry** (Analytical chemistry, Stereochemistry etc.)
- **Sports** (participation in Cricket, Kho-kho, Basket ball etc.)
- **Ant other relevant course suggested by Board of studies**

METHODOLOGY AND ASSESSMENT:

1. Students individually have to select an area, subarea and identify a topic.
2. Students can complete the course by
    a. Enrolling for SWAYAM course, conducted online and obtain certificate of completion and submit copy of the same to department.
    b. Participating in NSS activities, Sports activities and competitions organized at Institute, University, State, National level and submit certificate issued by competent authority to the department.
3. Student should prepare action plan for completion of the course and submit the same to department after completion of Unit Test-1.
4. After submission of the certificate, department will send list of successful candidates to COE

Semester II

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

SHP516 ADVANCED ENGINEERING MATHEMATICS

L	T	P	Credits
2	0	0	2

COURSE DESCRIPTION:

The objective of the course is to develop level of mathematical sophistication that is appropriate and expected in the Engineering Profession, to understand the impacts of engineering solutions as well as to motivate them to apply their applications to engineering problems and to understand the impacts of engineering solutions as well as to motivate them to apply their applications to engineering problems

COURSE OUTCOMES:

On completion of this course student will be able to:

- Identify, formulate and analyze the engineering problem.
- Apply Mathematical concepts effectively to engineering fields.
- Find Laplace & Fourier Transforms and inverse Laplace & Fourier transforms of various functions and apply it to solve differential equations
- Explain and apply the concepts of Probability, Distributions and Joint Probability Distributions.
- Apply the knowledge of theory of Partial Differential Equations, Matrices, to solve problems in mathematics as well as allied engineering areas.
- Describe the concept of Complex Analysis and its applications.

UNIT-I **06**

LAPLACE & Z TRANSFORMS: Concept of Transforms, Laplace Transform (LT) and its existence, Properties of Laplace & Z-Transform, Evaluation of inverse Laplace & Z-Transform & applications

UNIT-II **06**

FOURIER TRANSFORMS: Introduction, Fourier Integral Theorem, Fourier Sine and Cosine Integral, Complex form of Fourier Integrals, Fourier Transforms, Inverse Fourier Transform, Properties, Modulation Theorem, Convolution Theorem for Fourier Transforms, Parseval's Identity, Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform.

UNIT-III **06**

LINEAR ALGEBRA&REGRESSION ANALYSIS: Matrices, eigen values and eigen vectors Correlation, Karl Pearson's coefficient of correlation, Correlation coefficient for a bivariate distribution, Regression coefficient, regression lines, Reliability of regression estimates. Interpolation techniques (Curve fitting)

UNIT-IV **06**

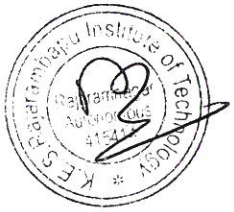
THEORY OF COMPLEX VARIABLES: A review of concept of limit, continuity, differentiability & analytic functions. Cauchy Riemann Equations, Line Integral in the complex plane, Cauchy Integral Theorem & Cauchy Integral Formula & its consequences, Power series & Taylor Series(in brief),Zeros & Singularity, Laurent' Series, Residues, Evaluation of Real Integrals

UNIT-V **06**

PROBABILITY AND DISTRIBUTIONS: Random Variables: Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function. Standard Distributions: Uniform, Binomial, Geometric, Negative Binomial, Poisson, Exponential, Gamma, Normal

UNIT-VI **06**

OPTIMIZATION TECHNIQUES: Basic concept of optimization, classification of optimization, optimization techniques, and engineering applications of optimization, Classical optimization techniques: unconstrained optimization single-variable optimization, multivariable



optimization, multivariable optimization with equality constraints: solution by direct search method, solution by Lagrange-multipliers method, multivariable optimization with inequality constraints, Kuhn-Tucker conditions. Introduction to Computational Game theory

TEXT BOOKS:

- Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers39thedition: 2005
- A Text Book of Engineering Mathematics, N.P.Bali, Ashok Saxena and N.Ch. S. N. Iyengar, Laxmi Publications, New Delhi, sixth edition, 2004

REFERENCE BOOK:

- A Text Book of Applied Mathematics, Vol. I, Vol. II, P. N. Wartikar and J. N. Wartikar, Vidhyarthi Griha Prakashan, Pune, 9th Revised Edition, September 2005
- Applied Mathematics, Ch. V. Raman Murty, N. C. Srinivas, S. Chand and Company Ltd. Ramnagar, New Delhi, 1st edition, 2001
- Advanced Engineering Mathematics, Kreyszig E., Wiley Eastern, 8th edition, 2007
- Engineering Mathematics, Sastry, S. S., Vol. I and II, Prentice hall, 4th edition, 2009
- Advanced Engineering Mathematics, Peter V. O'neil, Cole Publishing House, 4th Edition, 2002.
- An Introduction to Game Theory, J. Osborne, Oxford University Press, 2004

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2013 RADIO FREQUENCY ENGINEERING

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION

Radio Frequency Engineering course is offered as the core course at the second semester of Electronics Engineering post-graduate programme; consist of two modules. The first module constitutes the study of RF link design, microstrip patch antennas, the design of various types of impedance matching circuits, and the design of various types of microwave filters. The second module covers the analysis of planer power dividers and directional couplers, design of microwave amplifier and oscillator.

COURSE OUTCOMES:

After successful completion of this course students should be able to;

- Describe microwave networks and circuits.
- Compute parameters of microwave networks and circuits.
- Aanalyze microwave filters, matching networks, amplifiers and oscillators.
- Design RF link, microwave networks and circuits.

PREREQUISITE:

Good basic knowledge of Electromagnetic Engineering course offered at the undergraduate programme. Students should have clear understanding of the boundary conditions, Maxwell's equations, and transmission line analysis.

UNIT-I **06**

MICROSTRIP ANTENNAS AND RF LINK DESIGN: RF Link Design, Rectangular patch-cavity model, PIFA antenna.

UNIT-II **06**

IMPEDANCE MATCHING AND TUNING: Matching using lumped components. The Quarter-Wave Transformer, The theory of small reflections: Single- Section Transformer, Multi-section Transformer, Binomial Multi-section Matching Transformers, Chebyshev Multi-section Matching Transformers, The Bode-Fano Criterion.

UNIT-III **07**

MICROWAVE FILTER DESIGN: ABCD parameters of networks, Filter design by the insertion loss method, low pass prototypes, Filter transformations, impedance and frequency scaling, Richard's Transformation, Kuroda's identities, Impedance and Admittance inverters, Stepped impedance low pass filters, Coupled line filters: Filter properties of a coupled line section, Design of Coupled line Band pass Filters, Microstrip discontinuities and their compensation.

UNIT-IV **06**

PLANAR POWER DIVIDERS AND DIRECTIONAL COUPLERS : S-parameters of terminated two port network, Basic Properties of Dividers and Couplers: Three-port networks, four port networks, The T-junction Power divider: Lossless Divider, Resistive Divider, The Wilkinson Power divider: Even-odd mode analysis, The Quadrature (90^0) hybrid.

UNIT-V **07**

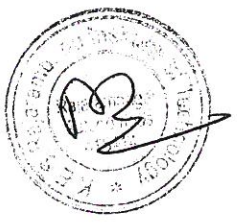
MICROWAVE AMPLIFIER DESIGN: Two port power gains, Gain and stability, Single stage Transistor amplifier design: Design for Maximum Gain (Conjugate matching), Constant gain circles and design for specified gain (Unilateral device), Low noise amplifier design.

UNIT-VI **04**

MICROWAVE OSCILLATOR DESIGN: One-port Negative resistance oscillator, Transistor oscillator, Dielectric resonator oscillator.

REFERENCE BOOKS:

- Microwave Engineering, David M. Pozar, 3rd Edition, Publisher-Wiely Interscience.
- Antenna Theory, Constantine A. Balanis, Publisher- John Wiely & Sons Inc.3rd edition
- Metamaterials with negative parameters, Ricardo Marques, Ferran Martin and Mario Sorolla. Publisher-Wiely Interscience.2007



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2023 PROTOCOLS AND INTERFACES (ELECTIVE-I)

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

This course introduces the principles of computer organization and the basic architecture concepts. The course emphasizes performance and cost analysis, instruction set design, pipelining, memory technology, memory hierarchy, virtual memory management, and I/O systems.

PRE-REQUISITES:

Basic knowledge in microprocessors and microcontrollers

COURSE OUTCOME:

After learning the course the students should be able to:

- Explain the fundamentals of computer organization.
- Develop program to demonstrate the data processing in microcontroller.
- Explain the interface between microcontroller peripherals.
- Describe the user interface design for microcontroller based design.
- Describe the concepts of interfacing protocols for various peripherals.

UNIT-I **6**

INTRODUCTION: Basic concepts of computer organization. The stored program model. classes of computer architecture. Processor vs. System architecture. Elements of computer systems – processors, memories, I/Os, disks, buses

UNIT-II 6

DATA PROCESSING IN MICROCONTROLLERS: Programs based on data transfer, arithmetical, logical, branching, bit (Boolean) operation instructions

UNIT-III 6

ORGANIZATION COMMUNICATIONS OF MICROCONTROLLER: The object of control Data Transfers between On-chip hardware Microcontroller and peripheral Units. Signal processing and conditioning. Timing Function conditioning. Software conversion of codes. Software support of A/D and D/A Converters

UNIT-IV 6

INTERFACING WITH MICROPROCESSOR SYSTEMS: Organization communications of Operator with Microcontroller. Keyboard and Display interfacing. Input/output enhancement mode

UNIT-V 6

PROTOCOLS TYPES OF MEMORY INTERFACES: SRAM, DRAM, Flash, EPROM/ROM and corresponding protocols. Types of Disk protocols – SATA, IDE, SCSI Special memories – Video RAMs, RDRAM, CAM

UNIT-VI 6

INTERRUPT CONTROLLERS: priorities and arbitration. ISRs and context saving architectures. Programmable interrupt controller PCI, USB, 1394, Ethernet, 802.11x PCI Express, ACPI Bridge functions Storage area networks and protocols

REFERENCE BOOKS:

- Computer Architecture, A Quantitative approach by D.Patterson and J. Hennessy 4th edition Elsevier publication 2007
- Computer Organization by D. Patterson and J.Hennessy 4th edition 2008 Elsevier publication2008
- Bus Specifications - PCI, PCIe, SCSI, IDE, USB, 802.11x, SATA

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2023 MOBILE COMMUNICATION TECHNOLOGY (ELECTIVE-I)

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

The course deals with the security and privacy problems in the realm of wireless networks and mobile computing. The course is useful for research to work in the fields of mobile and wireless security and privacy and new areas to perform research.

COURSE OUTCOMES:

After completion of this course students will be able to:

- Identify mobile multimedia applications and its properties.
- Describe audio codecs and voice codecs.
- Differentiate multimedia services.

PREREQUISITE: mobile communication basics

UNIT-I

6

INTRODUCTION TO MULTIMEDIA FOR MOBILE: Mobile multimedia application properties, Mobile multimedia telephony, mobile multimedia streaming. 4L The PSS standard, media traffic characteristics, content, creation and distribution Media content and rate controls, speech streaming traffic, video streaming traffic

UNIT-II

6

AUDIO FOR MOBILE AND STANDARD : Brief introduction of audio codecs. MP3,AAC,WMA formats Synthetic polyphonic sound format, DLS Voice codecs. Videos for mobile and standrad : Video telephony, video straming, MMS, video compression (H.263,MPEG – 4, H. 264, 3gp) brief inoduction of video codecs.

UNIT-III 6

Multimedia services : Multimedia messaging service, voice mail, video caller ID, video portal for mobile, mobile TV, components for delivering multimedia service, gateways, media service, multimedia end points.

UNIT-IV 6

Qos issues for mobile multimedia: Bandwidth, error rates, delivery order,delay, jitter, segmentation issues, frame based Qos issues,PSNR based Qos metrics, Delay based Qos metrics, call control based Qos

UNIT-V 6

LTE SYSTEM ARCHITECTURE: LTE Architecture: Access Network (E-UTRAN) and Core Network (EPC) ,LTE service modelling , E-UTRAN: Functional entities, interfaces and protocols, EPC: Functional entities, interfaces and protocols , Terminals

UNIT-VI 6

MOBILITY AND SESSION MANAGEMENT IN LTE : - Session Management: IP-based connectivity. PDN connections. EPS Bearer services. Session Management procedures. QoS Model. Mobility Management: Handover and mobility management procedures.

REFERENCE BOOKS:

- Dahlman, E.; Parkvall, S.; Skold, J.; Beming, P. 3G Evolution: HSPA and LTE for mobile broadband. 2nd ed. Amsterdam: Elsevier, 2008. ISBN 978-0-12-374538-5.
- Olsson, M. [et al.]. SAE and the evolved packet core: driving the mobile broadband revolution. Oxford: Academic Press, 2009.ISBN 978-0123748263.
- Fundamentals oF 5G mobile networks by Jonathan Rodriguez, This edition first published 2015 , John Wiley & Sons, Ltd

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2043 EMBEDDED OS AND DEVICE DRIVERS (ELECTIVE II)

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

The objective of the subject is to provide understanding of the techniques essential to the design and implementation of device drivers and kernel internals of embedded operating systems. This course provides the students with an understanding of the aspects of the Real-time Operating Systems and to provide an understanding of the techniques essential to the design and implementation of real-time embedded systems.

PRE-REQUISITES:

Basic fundamental knowledge of RTOS.

COURSE OUTCOMES

After successful completion of the course, students should be able to:

- Explain Embedded OS (Linux) fundamentals
- Build device driver and kernel internal for Embedded OS & RTOS.
- Describe the entire driver development lifecycle, through debugging and maintenance
- Demonstrate Linux support for wireless technologies such as Bluetooth, Infrared, WiFi, and cellular networking

UNIT I **6**

INTRODUCTION: Embedded System Architecture fundamentals. Hardware and Software abstraction models. Operating Systems fundamentals. Real time OS overview.

UNIT II 6

RTOS FUNDAMENTALS: Study of Real time OS principles and requirements. Application specific requirements. Throughput and latency requirements. Schedulers, tasks and processes. Memory management. Code and footprint optimization. Study of current and emerging RTOS.

UNIT III 6

OS INTERNALS AND KERNELS: Internal components of Operating systems. Study, compare and contrast of various OS platforms. Unix/Linux kernel fundamentals. I/O devices, file systems and peripheral devices.

UNIT IV 6

DEVICE DRIVERS-I: Fundamentals of device drivers, device enumeration and configuration. Data transfer and management mechanisms. Character Drivers- Basics, Device Example: System CMOS, Sensing Data Availability, Talking to the Parallel Port, RTC Subsystem, Pseudo Char Drivers, Misc Drivers, Character Caveats, Looking at the Sources

UNIT V 6

DEVICE DRIVERS II : Wired and wireless connectivity of devices. Power Management and its impact on device management. Compliance to protocols. Serial Drivers Layered Architecture, UART Drivers, TTY Drivers, Line Disciplines, Input Drivers, Input Event Drivers, Input Device Drivers, Debugging. Linux without Wires Bluetooth, Infrared, WiFi, Cellular Networking, Current Trends

UNIT VI 6

THE INTER-INTEGRATED CIRCUIT PROTOCOL: What's I2C/SMBus? I2C Core, Bus Transactions, Device Example: EEPROM, Device Example: Real Time Clock, I2C-dev, Hardware Monitoring Using LM-Sensors, The Serial Peripheral Interface Bus, The 1-Wire Bus, Debugging

TEXT BOOK:

- Essential Linux Device Drivers by Sreekrishnan Venkateswaran, Publisher: Prentice Hall Publication, 2008
- Writing Linux Device Drivers: A Guide with Exercises, J. Cooperstein ,2009

REFERENCES:

- Product documentation from ARM (KEIL), Cypress, Windows Mobile, VxWorks, Symbian.
- BUS Specifications– Bluetooth, USB, 802.11 xs
- Standards Specifications -JPEG, MPEG etc.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2033 MOBILE ADHOC NETWORKS

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION:

This course covers major aspects of ad hoc networks, from design through performance issues to application requirements. It starts with characteristics features, applications of ad hoc networks, Modulation techniques and voice coding. It also covers the IEEE 802.11 Wireless LAN and Bluetooth standards

COURSE OUTCOMES:

After completion of this course students will be able to:

- Differentiate MANETs and WSNs, from an industry and research point of views.
- Describe principles of mobile ad hoc networks (MANETs)
- Evaluate routing protocols

PREREQUISITE: Mobile communication basics

6

UNIT-I

INTRODUCTION TO AD HOC NETWORKS : definition, characteristics features, applications. Characteristics of Wireless channel, Modulation techniques, multiple access techniques, voice coding, error control, computer networks, computer networks software, computer network architecture, IEEE 802 Networking standard, fundamentals of WLANs, Bluetooth..

6

UNIT-II

WIRELESS WANS: The cellular concept, cellular architecture, the first generation cellular systems, the second generation cellular systems, the third generation cellular systems, wireless in

local loop, IEEE 802.11standard, IEEE 802.16 standard. Wireless Internet: What is wireless internet? Mobile IP. Ad HocWireless Networks: Introduction, Issues in Ad HocWireless Networks, Ad Hoc Wireless Internet.

UNIT-III

6

MAC PROTOCOLS: design issues, goals and classification. Contention based protocols, Contention based protocols with reservation mechanisms, and Contention based MAC protocols with Scheduling mechanisms, MAC protocols that use directional antennas, protocols using directional antennas, Other MAC protocols.

UNIT-IV

6

ROUTING PROTOCOLS: Design issues, goals and classification. Table driven routing protocols, on-demand routing protocols, Hybrid routing protocols, Hierarchical routing protocols, power-aware routing protocols.

UNIT-V

6

MULTICAST ROUTING IN AD HOC WIRELESS NETWORKS: Issues in designing a multicast routing protocols, operation of multicast routing protocols, classification, Tree based multicast routing protocols.

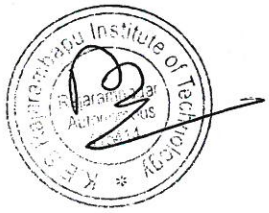
UNIT-VI

6

TRANSPORT LAYER AND SECURITY PROTOCOLS FOR AD HOC WIRELESS NETWORKS: Issues in designing- Transport layer, classification of Transport Layer solutions, TCP over Ad Hoc wireless networks, other transport layer protocols for Ad Hoc wireless networks, Security in ad hoc wireless networks: issues and challenges in security provisioning, network security attacks, Key management, secure routing in Ad Hoc wireless networks. QoS in Ad Hoc Wireless networks:

REFERENCES BOOKS:

- C. Siva Ram Murthy and B. S. Manoj, "Ad hoc Wireless Networks Architectures and protocols", 2nd edition, Pearson Education. 2007.



- 2 Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, "Mobile ad hoc
- networking", Wiley-IEEE press, 2004.
- Mohammad Ilyas, "The handbook of adhoc wireless networks", CRC press, 2002.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2063 MOBILE APPLICATIONS DEVELOPMENT (ELECTIVE III)

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION:

The study of embedded systems architecture, mobile system constraints and application development .In the process of the laboratory work it is necessary to use and study standard and emerging development kits or developer suites for mobile platforms for OS development.

PRE-REQUISITES:

Basic knowledge in Java, HTML, Java script.

COURSE OUTCOME:

After learning the course the students should be able to:

- Enumerate the mobile application development platforms and explain the concepts of web application development in mobile devices.
- Describe the application development using third party frameworks.
- Describe the concepts of application development in automotive domain.
- Develop android mobile applications using Android SDK

UNIT I 6

OVERVIEW OF MOBILE APP AND MOBILE INTERFACE : Mobile System, Mobile Interface and Applications, Mobile Cloud

UNIT II 6

QUICK START ON ANDROID. Installing Java, Installing Integrate Development Environment, Installing Android SDK Creating an Android Application, Android Virtual Device, App Components, App Resources App Mainfest

UNIT III 6

2D GRAPHICS AND MULTIMEDIA IN ANDROID: Introduction of 2D Graphics Techniques, Advanced UI Design, Overview of Multimedia in Android, Audio Implementations in Android, Executing Video in Android

UNIT IV 6

MOBILE EMBEDDED SYSTEM ARCHITECTURE: Embedded Systems, Scheduling Algorithms, Memory Technology, Mobile Embedded Systems, Messaging and Communication Mechanisms

UNIT V 6

DATA STORAGE: SQLite Operations Local Data, SQLite Database, Content Provider, Introduction of heterogeneous embedded systems and dynamic programming, Fixed Time Model, Probabilistic Time Model, Nondeterministic Polynomial Time Problems

UNIT VI 6

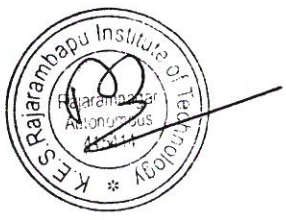
MOBILE OPTIMIZATIONS BY LOOP SCHEDULING: Introduction, Basic Graph Models and Techniques, Fundamental Timing Optimizations Time and Power Optimizations with Loop Scheduling, Conclusions

TEXT BOOK:

- Mobile Applications Development with Android: Technologies and Algorithms by Meikang Qiu, Wenyun Dai, Keke Gai. 2016 , Chapman and Hall/CRC Publication.

REFERENCES:

- iPhone/iPad developer manual
- Android Developer manual
- Standards Specifications– JPEG, MPEG etc. as required



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2043 SECURITY IN MOBILE AND WIRELESS SYSTEM (ELECTIVE III)

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION:

The course deals with the security and privacy problems in the realm of wireless networks and mobile computing. The course is useful for research to work in the fields of mobile and wireless security and privacy and new areas to perform research.

COURSE OUTCOMES:

After completion of this course students will be able to:

- Explain wireless and mobile network security and its relation to the new security based protocols.
- Apply proactive and defensive measures to counter potential threats, attacks and intrusions.
- Design secured wireless and mobile networks that optimise accessibility whilst minimising vulnerability to security risks.

PREREQUISITE: TCP/IP, Principles of Network Security

UNIT-I **6**

INTRODUCTION: Security and Privacy for Mobile and Wireless Networks: Introduction- State of the Art- Areas for Future Research- General Recommendation for Research. Pervasive Systems: Enhancing Trust Negotiation with Privacy Support: Trust Negotiation- Weakness of Trust Negotiation- Extending Trust Negotiation to Support Privacy

UNIT-II 6

MOBILE SECURITY : Mobile system architectures, Overview of mobile cellular systems, GSM and UMTS Security & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

UNIT-III 6

SECURING WIRELESS NETWORKS : Overview of Wireless security, Scanning and Enumerating 802.11 Networks, Attacking 802.11 Networks, Attacking WPA protected 802.11 Networks, Bluetooth Scanning and Reconnaissance, Bluetooth Eavesdropping, Attacking and Exploiting Bluetooth, Zigbee Security, Zigbee Attacks

UNIT-IV 6

ADHOC NETWORK SECURITY : Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management in Adhoc Wireless Networks, Secure Routing in Adhoc Wireless Networks

UNIT-V 6

RFID SECURITY : Introduction, RFID Security and privacy, RFID chips Techniques and Protocols, RFID anti-counterfeiting, Man-in-the-middle attacks on RFID systems, Digital Signature Transponder, Combining Physics and Cryptography to Enhance Privacy in RFID Systems, Scalability Issues in Large-Scale Applications, An Efficient and Secure RFID Security Method with Ownership Transfer, Policy-based Dynamic Privacy Protection Framework leveraging Globally Mobile RFIDs, User-Centric Security for RFID based Distributed Systems, Optimizing RFID protocols for Low Information Leakage, RFID: an anti-counterfeiting tool.

UNIT-VI 6

MOBILE PHONE FORENSICS : Crime and mobile phones, evidences, forensic procedures, files present in SIM card, device data, external memory dump, evidences in memory card, operators systems- Android forensics: Procedures for handling an android device, imaging android USB mass storage devices, logical and physical techniques.

REFERENCES :

- Kia Makki, Peter Reiher, "Mobile and Wireless Network Security and Privacy ", Springer, ISBN 978-0-387-71057-0, 2007.
- C. Siva Ram Murthy, B.S. Manoj, "Adhoc Wireless Networks Architectures and Protocols", Prentice Hall, x ISBN 9788131706885, 2007.
- NoureddineBoudriga, "Security of Mobile Communications", ISBN 9780849379413, 2010.
- Kitsos, Paris; Zhang, Yan , "RFID Security Techniques, Protocols and System-On-Chip Design ", ISBN 978-0-387-76481-8, 2008.
- Johny Cache, Joshua Wright and Vincent Liu," Hacking Wireless Exposed: Wireless Security Secrets & Solutions ", second edition, McGraw Hill, ISBN: 978-0-07-166662-6, 2010.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2083 SOFT COMPUTING

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION:

This course provides an introduction to the basic concepts of Soft Computing methodology and covers three main components – Neural Networks, Fuzzy Logic and genetic algorithm. The course combines theoretical foundations with practical applications using different tools and techniques.

COURSE OUTCOMES:

After learning the course the students should be able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
- Apply genetic algorithms to combinatorial optimization problems
- Apply neural networks to pattern classification and regression problems
- Use existing software tools to solve real problems using a soft computing approach

PREREQUISITE: Nil

UNIT-I 6

INTRODUCTION: What is soft computing? Differences between soft computing and hard computing, Soft Computing constituents, Methods in soft computing, Applications of Soft Computing

UNIT-II 6

NEURAL NETWORKS: Concept, biological neural syste,. Evolution of neural network, McCulloch-Pitts neuron model, activation functions, feedforward networks, feedback networks, learning rules - Hebbian, Delta, Percepron learning and Windrow-Hoff.

UNIT-III 6

SUPERVISED LEARNING: Perceptron learning, single 1 layer/multilayer perceptron, linear separability, hidden layers, back popagation algorithm, Radial Basis Function network; Unsupervised learning - Kohonen, SOM, Counter-propagation, ART, Reinforcement learning, adaptive resonance architecture, applications of neural networks to pattern recognition systems such as character recognition, face recognition, application of neural networks in image processing

UNIT-IV 6

FUZZY SYSTEMS : Basic definition and terminology, set-theoretic operations, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules & Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making; Neuro-fuzzy modeling- Adaptive Neuro-Fuzzy Inference Systems, Coactive Neuro-Fuzzy Modeling, Classification and Regression Trees, Data Clustering Algorithms, Rulebase Structure Identification and Neuro-Fuzzy Control , Applications of neuro-fuzzy modeling

UNIT-V 6

GENETIC ALGORITHMS : Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, building block hypothesis and schema theorem.; Genetic algorithms operators- methods of selection, crossover and mutation, simple GA(SGA), other types of GA, generation gap, steady state GA, Applications of GA

UNIT-VI 6

SWARM INTELLIGENCE: What is swarm intelligence? Various animal behavior which have been used as examples, ant colony optimization, swarm intelligence in bees, flocks of birds, shoals offish, ant-based routing, particle swarm optimization

TEXT BOOKS:

- S.N. Shivanandam, Principle of soft computing, Wiley. ISBN13: 9788126527410(2011)
- Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing",Prentice-Hall of India, 2003.
- George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall,1995.
- James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson publication, 2003.

REFERENCE BOOKS:

- Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998. 2.David E. Goldberg, Genetic Algorithms in Search, Optimization & Machine Learning, Addison Wesley, 1997.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2093 EMBEDDED SYSTEM LAB -I (ELECTIVE- I)

L	T	P	Credits
0	0	4	2

COURSE DESCRIPTION:

Embedded OS & Device Driver Lab is offered as the elective Practical course at the second semester of M. Tech Electronics & Digital System Engineering consist of minimum 10 experiments. This involves the techniques essential to the design and implementation of device drivers and kernel internals of embedded operating systems.

PRE-REQUISITES:

Basic fundamental knowledge of RTOS.

COURSE OUTCOMES.

After successful completion of the course, students should be able to:

- Write a Kernel program to different modules
- Write a kernel program with the use of different commands
- Build & test device driver and kernel internal for Embedded OS & RTOS.
- Write report and analyze the result

LIST OF EXPERIMENTS: (WITH OPEN ENDED PROBLEMS)

Students can perform minimum 10 experiments based on following topics

- Create n child processes in a chain sequence and also create unlimited number of child processes and check the limit.

- Write a kernel program for loading two dynamic modules where one module depends on the other
- Write a kernel program for I/O devices, file systems and peripheral devices.
- Write a kernel program for Character Drivers
- Write a kernel program that passes the number of devices for a particular module as command line argument
- Write a kernel program that prints the name of the process and its PID
- Write a program to Talking to the Parallel Port
- Write a program to run date, calendar and ls command using fork () and excel () system calls.
- Implementation of Serial Peripheral Interface Bus.
- Implementation of 1-Wire Bus

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2053 COMMUNICATION LAB -I (ELECTIVE- I)

L	T	P	Credits
0	0	4	2

COURSE DESCRIPTION:

Wireless technology has enormous potential to change the way people and things communicate. Future wireless networks will allow people on the move to communicate with anyone, anywhere, and at any time using a range of high-performance multimedia services. Wireless video will support applications such as enhanced social networking, distance learning and remote medicine. Wireless sensor networks can also enable a new class of intelligent home electronics, smart and energy-efficient buildings and highways, and in-body networks for analysis and treatment of medical conditions.

COURSEOUTCOMES:

After completion of this course students will be able to:

- Architect sensor networks for various application setups.
- Assess coverage and conduct node deployment planning.
- Devise appropriate data dissemination protocols and model links cost.
- Determine suitable medium access protocols and radio hardware.
- Evaluate the performance of sensor networks and identify bottlenecks.

PREREQUISITE:

Students should have knowledge of wireless communication

PRACTICAL LIST:

Student should perform minimum 10 experiments based on the following contents

- Different scenario creation of WSN

- Different scenario creation of IoT
- Development of single node architecture
- WSN architecture development
- Performance testing of WSN and IoT
- LTE development and testing
- OFDM performance testing

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

EDS2113 EMBEDDED SYSTEM LAB -II (ELECTIVE- II)
MOBILE APPLICATIONS DEVELOPMENT WITH ANDROID LAB

L	T	P	Credits
0	0	4	2

COURSE DESCRIPTION:

Emphasis is placed on the processes, tools, APIs and frameworks required to develop applications for current and emerging mobile computing devices. Student will work at all stages of the software development life-cycle from inception through to implementation and testing. In doing so, Students will be required to consider the impact of user characteristics, device capabilities, networking and deployment environment, in order to develop software capable of meeting the market requirements.

This course also will focus on data handling and connectivity via SOAP or REST to backend services potentially in a hosted environment. The course discusses design approaches to efficiently reach a large segment in the mobile market. Introduction to Google APIs for android and functionalities including GEO positioning, accelerometer, and rich gesture based UI handling and, finally, specifics such as motion sensing.

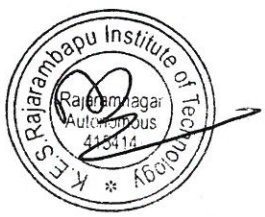
Student will gain advanced knowledge of the Android platform including: issues and techniques, structuring (modeling) applications for efficiency and reliability, accessing Web Services and integrating with 3rd party libraries.

PRE-REQUISITES:

Having knowledge of basics of Object oriented programming in Java or C#, and skills in web technologies, CSS, HTML

COURSE OUTCOME:

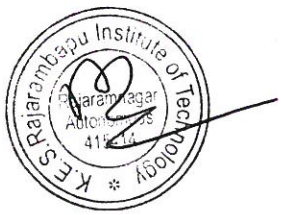
After learning the course the students should be able to:



- Programming skills to use in constructing a complete end-to-end mobile system
- Describe advanced Java programming concepts and languages challenges
- Develop android mobile applications using Android SDK
- Verify, Debug, and Deploy mobile applications

PRACTICAL LIST

- Components and structure of a mobile development framework
- Mobile application models/architectures and patterns to the development
- Evaluate mobile applications on design pros and cons
- Develop mobile applications on an android platform
- Design and develop sophisticated user Interfaces for the Android platform
- Save state information across important operating system events
- Use Google mobile programming APIs
- Business Models data and handling server-client interactions
- Authentication and handling notifications



FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2063 COMMUNICATION LAB -II (ELECTIVE- II)

L	T	P	Credits
0	0	4	2

COURSE DESCRIPTION:

Wireless sensor network will be the example network we will use with specific constraints demonstrating the design and implementation of process of the different routing protocols.

COURSEOUTCOMES:

After completion of this course students will be able to:

- Describe the unique issues in ad hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing protocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Ad-hoc/sensor networks.

PREREQUISITE:

Students should have knowledge of wireless communication

PRACTICAL LIST:

Student should perform minimum 10 experiments on the Routing Protocol implementation and testing

- Study of different routing protocols
- Implementation of Bellman ford routing protocol
- Implementation of AODV routing protocol

- Implementation of Leach routing protocol
- Implementation of Fisheye routing protocol
- Implementation of different routing protocols
- Performance analysis of different routing protocols.

FIRST YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-II

ECS2073 MINI PROJECT

L	T	P	Credits
0	0	2	2

COURSEOUTCOMES:

After completion of this course students will be able to:

- Select title of mini-project and formulate its objectives correctly
- Develop, simulate and implement the system by complying with desired technical specifications
- Analyze and synthesize obtained results in theoretical and practical context
- Present findings in logical order
- Write a report to document his/her findings

There will be one mini project implemented during the course of the semester. Mini project is composed of the following four parts:

- Problem Analysis
- Solution Design
- Build and Test (software /hardware)
- Demonstrate and Report

You will be expected to demonstrate a working design to meet the specifications of the assigned project

SECOND YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-III

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS3013	Field Training/MOOC/ NPTEL/Coursera/Courses suggested by BOS	--	--	--	2	ISE	2	100	50

COURSEOUTCOMES:

After completion of this course students will be able to:

- Student is able to apply engineering knowledge learned during the program
- Student is able to apply his/her technical skills to industrial problem
- Student is able to propose creative and innovative solution to the given problem.
- Student is able to work in multi-disciplinary setting
- Student is able to show concern for society, environment and other social concerns
- Student is able to complete all given tasks according to the industrial needs with full integrity and responsibility

FIELD TRAINING

In the field training work, student is expected to get training in the industry, related to subject specialization for duration of 15 days (minimum) for at least 6 hours per day.

The students who are doing course on MOOC/NPTEL/Coursera/Courses suggested by BOS should

- Select the course in consultation with supervisor and submit the details to Head of Program
- The course should be minimum 25 hours duration and should have certification facility.

- Student should complete course and get certificate the certificate copy should be submitted to head of program with supervisor signature.
- In case student opted for industrial training he/she should write a report and submit the same for evaluation to head of program.

SECOND YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-III

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks) Max	Practical (Marks) Min % for Passing
ECS3023	Dissertation Phase-I	--	--	--	4	ISE	4	100	50

COURSEOUTCOMES:

After completion of this course students will be able to:

- Identify research opportunities in his/her domain or multidisciplinary domains
- Formulate the problem statement and its objectives correctly
- Apply the principles of project management during development of the project
- Present synopsis in logical order
- Write synopsis of the proposed system

DISSERTATION PHASE-I

It consists of Synopsis Preparation and Synopsis approval by DPGC committee

SYNOPSIS PREPARATION

Postgraduate student should decide on the dissertation topic in consultation with its supervisor and come out with a synopsis of dissertation work, in July/August of an academic year. The Synopsis shall consist of three chapters - Introduction, Literature Review and Methodology with expected deliverables.

It is expected that student should have in-depth understanding of the selected problem, knowledge of probable solutions to the same problem and expected outcomes from the dissertation work.

The synopsis shall consist of following points

- Title

- Introduction
- Literature Survey
- Objectives
- Methodology
- Activity chart
- References

The title should be brief, accurate, descriptive, and comprehensive and clearly indicate the subject for the investigation.

The introduction part should include

- Area of the work
- Importance of the work

Literature review should

- Examine the most current studies on the topic and presenting the significant aspects of these studies.
- Compare different authors' views about the issue
- Summarize the literature in terms of a knowledge gap identification e.g. performance improvement of the existing system, functionality improvement of the existing, proposing an entirely new approach, etc.

It should be followed by the Problem statement formulated based on identified gap and objectives of the study

Methodology shall include information such as techniques, sample size, target populations, equipments, data analysis, etc. and explain why proposed methodology is most suitable to solve the undertaken problem.

It should be followed by activity chart mentioning probable duration for completion of various activities to be undertaken during dissertation work and appropriate list of references. The references should be from reputed journals such IEEE, Science direct, Elsevier etc.

SYNOPSIS APPROVAL AND EVALUATION BY DPGC COMMITTEE

The student should submit the synopsis duly signed by supervisor in the prescribed format to the department office. The DPGC committee is advised to conduct the Synopsis Presentation for the

students of the program within the stipulated period and give approval to the synopsis with the evaluation score. The committee is advised to find the enough complexity in the dissertation work, and all committee members should remain present at the time of the presentation.

The objective of the presentation is to find quality of work undertaken by the student, student's understanding about basic concepts required to carry out the work, scope of the work , correctness of the methodology, consistency of proposed work with dissertations works of other students and student's ability to communicate his or her ideas and work. The committee can suggest modifications in the synopsis if it does not fulfill above-mentioned requirements. The student should prepare a modified synopsis by incorporating suggestions given by members and give presentation again.

The supervisor must ensure that student have incorporated all suggestions.

SECOND YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-III

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS3033	Dissertation Phase-II	--	--	5	10	ISE	4	100	50
ECS3043	Dissertation Phase-II	--	--	5	10	ESE	6	100	50

COURSEOUTCOMES:

After completion of this course students will be able to:

- Identify research opportunities in his/her domain or multidisciplinary domains.
- Formulate the problem statement and its objectives correctly
- Develop, simulate and implement the system by complying with desired technical specifications
- Analyze and synthesize obtained results in theoretical and practical context
- Present report in logical order
- Write report of the system implementation
- Apply the principles of project management during development of the project

DISSERTATION PHASE-II

After synopsis approval, it is expected that student should start working on the selected problem as per activity chart given in the synopsis. It is expected that at least 40% dissertation work should be completed by a student in this phase.

EVALUATION OF DISSERTATION PHASE-II

Evaluation (ISE) of Dissertation Phase-II shall be carried before the end of the semester-III and shall be jointly evaluated by Supervisor and Internal-examiner appointed by DPGC committee.

The student should give presentation / demonstration of the work done. The examiners shall look at student's progress and quality of the work done. The suggestions shall be given to the student, if required. The student should keep a record of these suggestions and incorporate them in his or her work. The supervisor should ensure that suggestions given are incorporated by the student.

The End –semester examination (ESE) of Dissertation Phase-II shall be carried out by Controller-of-Examinations after the end of Semester-III. The student should give presentation and/or demonstration of completed work in front of supervisor and external examiner appointed by COE.

SECOND YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-IV

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS4013	Dissertation Phase-III	--	--	--	08	ISE	8	100	50

COURSEOUTCOMES:

After completion of this course students will be able to:

- Identify research opportunities in his/her domain or multidisciplinary domains.
- Formulate the problem statement and its objectives correctly
- Develop, simulate and implement the system by complying with desired technical specifications
- Analyze and synthesize obtained results in theoretical and practical context
- Present report in logical order
- Write report of the system implementation
- Apply the principles of project management during development of the project

DISSERTATION PHASE-III

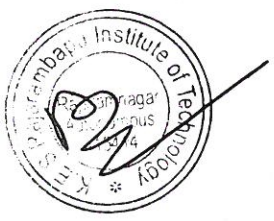
In Dissertation Phase-III, it is expected that student should complete at least 70% of the dissertation work and prepare a draft of the paper for publication.

EVALUATION OF DISSERTATION PHASE-III

The evaluation (ISE) of Dissertation Phase-III shall be carried out in March of the academic year by Supervisor and Internal examiner appointed by DPGC. The appointed members shall look at student's progress and quality of the work done. The suggestions shall be given to the student, if

required. The student should keep a record of these suggestions and incorporate them. The supervisor should ensure that suggestions given are incorporated by the student.

If student's progress is not as per expectation, the committee member shall issue a written notice to the student about probable extension.



SECOND YEAR M. TECH. ELECTRONICS ENGINEERING

SEM-IV

Course Code	Course	Teaching Scheme				Evaluation Scheme			
		L	T	P	Credits	Scheme	Credits	Practical (Marks)	
								Max	Min % for Passing
ECS4023	Dissertation Phase-IV	--	--	5	10	ISE	4	100	50
ECS4033	Dissertation Phase-IV	--	--	5	10	ESE	6	100	50

COURSEOUTCOMES:

After completion of this course students will be able to:

- Identify research opportunities in his/her domain or multidisciplinary domains.
- Formulate the problem statement and its objectives correctly
- Develop, simulate and implement the system by complying with desired technical specifications
- Analyze and synthesize obtained results in theoretical and practical context
- Present report in logical order
- Write report of the system implementation
- Apply the principles of project management during development of the project

DISSERTATION PHASE-IV

In Dissertation Phase-IV, it is expected that student should complete

- 100% implementation of the proposed system
- Simulation/ experimentation work on the proposed system
- Performance evaluation of the proposed system
- Comparison of the proposed system with existing systems
- Writing of the conclusion

- Preparation of a draft-copy of the dissertation report with Plagiarism report

EVALUATION OF DISSERTATION PHASE-IV

The DPGC committee is advised to evaluate the dissertation pre-submission presentation and/or system demonstration given by the students at the end of semester –IV within the stipulated period and give approval/modifications to the work done by the student along with the evaluation score.

The committee is advised to verify work completion as per the synopsis, and all committee members should remain present for the presentation. The objective of the presentation/ demonstration is to understand techniques implemented by the student, student's own contribution in the development process, obtained results, comparison of results with existing systems, and deliverables of the dissertation work.

The committee can suggest modifications if it does not fulfill above-mentioned requirements in the system/ draft copy of the report. In this case, the student should modify the system in a given time span based on suggestions given by the members and give presentation again in front of committee members.

The members should ensure that student has incorporated all suggestions and gives him/her approval to submit the dissertation work for final evaluation.

FINAL EVALUATION OF DISSERTATION WORK:

The final evaluation of the dissertation work shall be carried out by a three member committee, comprising of Chairman, External Examiner and concerned supervisor. This committee should be appointed by Controller of Examinations.

The student should give presentation and demonstration of work carried out in front of committee members. The external examiner and supervisor should evaluate student's performance based on following points

1. Justification and clarity of the problem statement and project objectives
2. Use of appropriate, applicable and justifiable methodology to solve problem undertaken
3. Reliability and validity of data collection instruments /resources used, critical data analysis and interpretation

4. Overall system design
5. Experimental Results and their comparison with existing systems
6. Critical analysis of obtained results and their interpretation and correlation with project deliverables
7. Scientific justification of conclusions
8. self contribution of the candidate in project development irrespective of use of readymade hardware/software
9. Presentation skills

The chairman shall ensure smooth conduct of the examination.