JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH IN EMBEDDED SYSTEMS.
EFFECTIVE FROM ACADEMIC YEAR 2017- 18 ADMITTED BATCH

COURSE STRUCTURE AND SYLLABUS

I Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-1	Embedded System Design	25	75	4	0	0	4
PC-2	ARM Processor Architectures	25	75	4	0	0	4
PC-3	Real Time Operating Systems	25	75	4	0	0	4
PE-1	Advanced Computer Architecture CMOS VLSI Design CPLD and FPGA Architectures and Applications	25	75	**3**	0	0	3
PE-2	Digital System Design Embedded C TCP / IP Internetworking	25	75	**3**	0	0	3
OE-1	***Open Elective – I**	25	75	3	0	0	3
Laboratory I	Embedded Systems Laboratory	25	75	0	0	3	2
Seminar I	Seminar - I	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

II Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-4	Embedded Computing	25	75	4	0	0	4
PC-5	System on Chip Architecture	25	75	4	0	0	4
PC-6	Sensors and Actuators	25	75	4	0	0	4
PE-3	Design for Testability Wireless Communications and Networks Scripting Languages	25	75	**3**	0	0	3
PE4	Advanced Digital Signal Processing Network Security and Cryptography Hardware Software Co-Design	25	75	**3**	0	0	3
OE-2	***Open Elective – II**	25	75	3	0	0	3
Laboratory II	Advanced Embedded Systems Laboratory	25	75	0	0	3	2
Seminar II	Seminar - II	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

III Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Technical Paper Writing	100	0	0	3	0	2
Comprehensive Viva-Voce	0	100	0	0	0	4
Project work Review II	100	0	0	0	22	8
Total	**200**	**100**	0	**3**	22	**14**

IV Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Project work Review III	100	0	0	0	24	8
Project Evaluation (Viva-Voce)	0	100	0	0	0	16
Total	**100**	**100**	**0**	**0**	**24**	**24**

***Open Elective subjects must be chosen from the list of open electives offered by OTHER departments.**

 # For Project review I, please refer 7.10 in R17 Academic Regulations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

EMBEDDED COMPUTING (PC - 4)

UNIT – I

Programming on Linux Platform:

System Calls, Scheduling, Memory Allocation, Timers, Embedded Linux, Root File System, Busy Box. **Operating System Overview**: Processes, Tasks, Threads, Multi-Threading, Semaphore, Message Queue.

UNIT – II

Introduction to Software Development Tools:

GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools,.

UNIT – III

Interfacing Modules:

Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, OpenCV for machine vision, Audio signal processing.

UNIT – IV

Networking Basics:

Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security.

UNIT – V

IA32 Instruction Set: application binary interface, exception and interrupt handling, interrupt latency, assemblers, assembler directives, macros, simulation and debugging tools.

TEXT BOOKS

1. Peter Barry and Patrick Crowley, "Modern Embedded Computing", 1st Edition., Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine
4. Intel® 64 and IA-32 Architectures Software Developer Manuals

REFERENCE BOOKS

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, "Operating System Concepts", Wiley
2. Maurice J. Bach, "The Design of the UNIX Operating System", Prentice-Hall
3. W. Richard Stevens, "UNIX Network Programming", Pearson

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

SYSTEM ON CHIP ARCHITECTURE (PC - 5)

UNIT – I

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT – II

Processors: Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT – III

Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT –I V

Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance-Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT – V

Application Studies / Case Studies: SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques –Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)
SENSORS AND ACTUATORS (PC - 6)

UNIT - I

Sensors / Transducers: Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization.

Mechanical and Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges, Inductive Sensors- Sensitivity and Linearity of the Sensor, Types- Capacitive Sensors, Electrostatic Transducer, Force/Stress Sensors using Quartz Resonators, Ultrasonic Sensors.

UNIT - II

Thermal Sensors: Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor, Dielectric Constant and Refractive Index Thermo-sensors, Helium Low Temperature Thermometer, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type Thermometric Sensors, Thermo-EMF Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermo-electric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors.

Magnetic Sensors: Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto-resistive Sensing, Semiconductor Magneto-resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros, Synchro-resolvers, Eddy Current Sensors, Electromagnetic Flowmeter, Switching Magnetic Sensors, SQUID Sensors.

UNIT - III

Radiation Sensors: Introduction – Basic Characteristics – Types of Photosensistors/Photo detectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors.

Electro Analytical Sensors: Introduction – The Electrochemical Cell – The Cell Potential – Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials – Polarization – Concentration Polarization-– Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media .

UNIT - IV

Smart Sensors: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for Smart Sensor Interface, the Automation.

Sensors Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing, Sensors for environmental Monitoring.

UNIT - V

Actuators: Pneumatic and Hydraulic Actuation Systems- Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves, Process control valves, Rotary actuators, Mechanical Actuation Systems- Types of motion, Kinematic chains, Cams, Gears, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection, Electrical Actuation Systems, Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C. Motors, A.C. Motors, Stepper motors.

TEXT BOOKS:

1. D. Patranabis, “Sensors and Transducers”, PHI Learning Private Limited.
2. W. Bolton, “Mechatronics”, Pearson Education Limited.

REFERENCE BOOKS:

1. Patranabis, “Sensors and Actuators”, 2nd Edition, PHI, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

DESIGN FOR TESTABILITY (PE - 3)

UNIT - I

Introduction to Testing: Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT - II

Logic and Fault Simulation: Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation, ATPG.

UNIT - III

Testability Measures: SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT - IV

Built-In Self-Test: The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-Per-Scan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

UNIT - V

Boundary Scan Standard: Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

TEXT BOOK:

1. M.L. Bushnell, V. D. Agrawal, “Essential of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits”, Kluwer Academic Publishers.

REFERENCE BOOKS:

1. M. Abramovici, M. A. Breuer and A.D Friedman, Digital Systems and Testable Design”, Jaico Publishing House.
2. P. K. Lala, “Digital Circuits Testing and Testability”, Academic Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

WIRELESS COMMUNICATIONS AND NETWORKS (PE - 3)

UNIT - I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring .

UNIT – II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT – III

Mobile Radio Propagation: Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT - IV

Equalization and Diversity: Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT - V

Wireless Networks: Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS:

1. Theodore, S. Rappaport, “Wireless Communications, Principles, Practice”, 2nd Ed., 2002, PHI.
2. Andrea Goldsmith, “Wireless Communications”, 2005 Cambridge University Press.
3. Kaveh Pah Laven and P. Krishna Murthy, “Principles of Wireless Networks”, 2002, PE
4. Gottapu Sasibhushana Rao, “Mobile Cellular Communication”, Pearson Education, 2012.

REFERENCE BOOKS:

1. Kamilo Feher, “Wireless Digital Communications”, 1999, PHI.
2. William Stallings, “Wireless Communication and Networking”, 2003, PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

SCRIPTING LANGUAGES (PE - 3)

UNIT - I

Introduction to Scripts and Scripting: Characteristics and uses of scripting languages, Introduction to PERL, Names and values, Variables and assignment, Scalar expressions, Control structures, Built-in functions, Collections of Data, Working with arrays, Lists and hashes, Simple input and output, Strings, Patterns and regular expressions, Subroutines, Scripts with arguments.

UNIT - II

Advanced PERL: Finer points of Looping, Subroutines, Using Pack and Unpack, Working with files, Navigating the file system, Type globs, Eval, References, Data structures, Packages, Libraries and modules, Objects, Objects and modules in action, Tied variables, Interfacing to the operating systems, Security issues.

UNIT - III

TCL: The TCL phenomena, Philosophy, Structure, Syntax, Parser, Variables and data in TCL, Control flow, Data structures, Simple input/output, Procedures, Working with Strings, Patterns, Files and Pipes, Example code.

UNIT - IV

Advanced TCL: The eval, source, exec and up-level commands, Libraries and packages, Namespaces, Trapping errors, Event-driven programs, Making applications 'Internet-aware', 'Nuts-and-bolts' internet programming, Security issues, running untrusted code, The C interface.

UNIT - V

TK and JavaScript: Visual tool kits, Fundamental concepts of TK, TK by example, Events and bindings, Geometry managers, PERL-TK. JavaScript – Object models, Design Philosophy, Versions of JavaScript, The Java Script core language, Basic concepts of Python.

Object Oriented Programming Concepts (Qualitative Concepts Only): Objects, Classes, Encapsulation, Data Hierarchy.

TEXT BOOKS:

1. David Barron, “The World of Scripting Languages”, Wiley Student Edition, 2010.
2. Brent Welch, Ken Jones and Jeff Hobbs., “Practical Programming in Tcl and Tk”, 4th Edition, Prentice Hall
3. Herbert Schildt, “Java the Complete Reference”, 7th Edition, TMH.

REFERENCE BOOKS:

1. Clif Flynt, “Tcl/Tk: A Developer's Guide”, 2003, Morgan Kaufmann Series.
2. John Ousterhout, “Tcl and the Tk Toolkit”, 2nd Edition, 2009, Kindel Edition.
3. Wojciech Kocjan and Piotr Beltowski, “Tcl 8.5 Network Programming book”, Packt Publishing.
4. Bert Wheeler, “Tcl/Tk 8.5 Programming Cookbook”, 2011, Packt Publishing Limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. – I YEAR – II SEMESTER (EMBEDDED SYSTEMS)

ADVANCED DIGITAL SIGNAL PROCESSING (PE - 4)

UNIT – I

Review of DFT, FFT, IIR Filters and FIR Filters: Introduction to filter structures (IIR & FIR).Implementation of Digital Filters, specifically 2nd Order Narrow Band Filter and 1st Order All Pass Filter. Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT - II

Non-Parametric Methods: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT - III

Parametric Methods: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

UNIT – IV

Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion. Examples of up-sampling using an All Pass Filter.

UNIT – V

Applications of Multi Rate Signal Processing: Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Transmultiplexers, Over Sampling A/D and D/A Conversion.

TEXT BOOKS:

1. .G. Proakis & D. G. Manolakis, “Digital Signal Processing: Principles, Algorithms & Applications”, J 4th Edition, PHI.
2. Alan V Oppenheim & Ronald W Schaffer, “Discrete Time signal processing”, PHI.
3. Emmanuel C. Ifeacher, Barrie. W. Jervis, “DSP – A Practical Approach”, 2nd Edition, Pearson Education.

REFERENCE BOOKS:

1. S. M .Kay, “Modern spectral Estimation: Theory & Application” 1988, PHI.
2. P. P. Vaidyanathan, “Multi Rate Systems and Filter Banks”, Pearson Education.
3. Kaluri V. Rangarao, Ranjan K. Mallik, “Digital Signal Processing: A Practitioner's Approach”, ISBN: 978-0-470-01769-2, 210 pages, November 2006 John Wiley.
4. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, “Digital Signal Processing”, 2000,TMH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

NETWORK SECURITY AND CRYPTOGRAPHY (PE - 4)

UNIT- I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security, Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT- II

Encryption Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block ciphers.

Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT - III

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT - IV

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm.

Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT – V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms: Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education.
2. William Stallings, "Network Security Essentials (Applications and Standards)", Pearson Education.

REFERENCE BOOKS:

1. Eric Maiwald, "Fundamentals of Network Security", Dreamtech press.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security - Private Communication in a Public World", Pearson/PHI.
3. Whitman, "Principles of Information Security", Thomson.
4. Robert Bragg, Mark Rhodes, "Network Security: The complete reference", TMH
5. Buchmann, "Introduction to Cryptography", Springer.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

HARDWARE SOFTWARE CO-DESIGN (PE - 4)

UNIT – I

Co - Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co - Synthesis Algorithms: Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT – II

Prototyping and Emulation: Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure.

Target Architectures: Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT – III

Compilation Techniques and Tools for Embedded Processor Architectures: Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT – IV

Design Specification and Verification: Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification

UNIT – V

Languages for System – Level Specification and Design-I: System – level specification, design representation for system level synthesis, system level specification languages,

Languages for System – Level Specification and Design-II: Heterogeneous specifications and multi-language co-simulation, the cosyma system and lycos system.

TEXT BOOKS:

1. Jorgen Staunstrup, “Hardware / Software Co- Design Principles and Practice”, Wayne Wolf, 2009, Springer.
2. Giovanni De Micheli, Mariagiovanna Sami, “Hardware / Software Co- Design”, 2002, Kluwer Academic Publishers

REFERENCE BOOKS:

1. Patrick R. Schaumont, “A Practical Introduction to Hardware/Software Co-design”, 2010, Springer

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. TECH. I YEAR II SEMESTER (EMBEDDED SYSTEMS)

ADVANCED EMBEDDED SYSTEMS LAB

The following programs to understand the use of RTOS with ARM Processor on IDE Environment Arm Tool chain and Library:

1. Create an application that creates two tasks that wait on a timer whilst the main task loops.
2. Write an application that creates a task which is scheduled when a button is pressed, which illustrates the use of an event set between an ISR and a task.
3. Write an application to demonstrates the Interruptible ISRs(Requires timer to have higher priority than external interrupt button
4. Write an application to test message queues and memory blocks
5. Write an application to test byte queues
6. Write an application that creates two tasks of the same priority and sets the time slice period to illustrate time slicing

Interfacing Programs:

7. Write an application that creates two tasks to blinking two different LEDs at different timings.
8. Write an application that creates two tasks displaying two different messages in LCD displays in two lines
9. Sending messages to mailbox by one task and reading the message from mailbox by another task
10. Sending messages to PC through serial port by three different tasks on priority basis
11. Basic Audio processing on IDE environment
12. Design and Simulation of Adder, Logic Gates, Decoders, Multiplexers, Flip-flops, Counters on FPGA Board.