# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

## B.Tech. in CSE (INTERNET OF THINGS)

## III & IV YEAR COURSE STRUCTURE & TENTATIVE SYLLABUS (R18)

**Applicable From 2020-21 Admitted Batch**

**III YEAR I SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | | Finite Automata and Compiler Design | 3 | 0 | 0 | 3 |
| 2 | | Microprocessors & Microcontrollers | 3 | 0 | 0 | 3 |
| 3 | | Computer Networks | 3 | 0 | 0 | 3 |
| 4 | | Database Management Systems | 3 | 0 | 0 | 3 |
| 5 | | Professional Elective - I | 3 | 0 | 0 | 3 |
| 6 | | Professional Elective - II | 3 | 0 | 0 | 3 |
| 7 | | Database Management Systems Lab | 0 | 0 | 3 | 1.5 |
| 8 | | Microprocessors & Microcontrollers Lab | 0 | 0 | 3 | 1.5 |
| 9 | | Advanced Communication Skills Lab | 0 | 0 | 2 | 1 |
| 10 | | Intellectual Property Rights | 3 | 0 | 0 | 0 |
| | | **Total Credits** | **21** | **0** | **8** | **22** |

**III YEAR II SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | | IoT Communication Protocols | 3 | 1 | 0 | 4 |
| 2 | | Computer Vision and Robotics | 3 | 1 | 0 | 4 |
| 3 | | Programming Languages for IoT | 3 | 1 | 0 | 4 |
| 4 | | Professional Elective – III | 3 | 0 | 0 | 3 |
| 5 | | Open Elective - I | 3 | 0 | 0 | 3 |
| 6 | | IoT lab | 0 | 0 | 3 | 1.5 |
| 7 | | Professional Elective - III Lab | 0 | 0 | 3 | 1.5 |
| 8 | | Computer Vision Lab | 0 | 0 | 2 | 1 |
| 9 | | Environmental Science | 3 | 0 | 0 | 0 |
| | | **Total Credits** | **18** | **3** | **8** | **22** |

**IV YEAR I SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | | IoT Cloud Processing and Analytics | 3 | 0 | 0 | 3 |
| 2 | | IoT Security | 2 | 0 | 0 | 2 |
| 3 | | Professional Elective - IV | 3 | 0 | 0 | 3 |
| 4 | | Professional Elective - V | 3 | 0 | 0 | 3 |
| 5 | | Open Elective - II | 3 | 0 | 0 | 3 |
| 6 | | IoT Security & Cloud Computing Lab | 0 | 0 | 2 | 1 |
| 7 | | Industrial Oriented Mini Project/ Summer Internship | 0 | 0 | 0 | 2* |
| 8 | | Seminar | 0 | 0 | 2 | 1 |
| 9 | | Project Stage – I | 0 | 0 | 6 | 3 |
| | | **Total Credits** | **14** | **0** | **10** | **21** |

**IV YEAR II SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|
| 1 | | Organizational Behaviour | 3 | 0 | 0 | 3 |
| 2 | | Professional Elective – VI | 3 | 0 | 0 | 3 |
| 3 | | Open Elective – III | 3 | 0 | 0 | 3 |
| 4 | | Project Stage – II | 0 | 0 | 14 | 7 |
| | | **Total Credits** | **9** | **0** | **14** | **16** |

***Note:** Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

MC – Environmental Science – Should be Registered by Lateral Entry Students Only.
MC – Satisfactory/Unsatisfactory.

**Professional Elective – I**

| | |
|---|---|
| | Architecting Smart IoT Devices |
| | Data Analytics for IoT |
| | IoT System Architectures |
| | Operating Systems for IoT |
| | Design and Analysis of Algorithms |

**Professional Elective – II**

| | |
|---|---|
| | Machine Learning |
| | Real Time Systems |
| | Embedded Hardware Design |
| | Energy Sources and Power Management |
| | Software Engineering |

**Professional Elective – III**

| | |
|---|---|
| | Mobile Application Development for IoT |
| | Software Testing Methodologies |
| | Cloud Computing and Virtualization |
| | Artificial Intelligence |
| | Lightweight Cryptography |

**# Courses in PE – III and PE – III Lab must be in 1-1 correspondence.**

**Professional Elective – IV**

| | |
|---|---|
| | Quantum Computing |
| | Wireless Networks |
| | Augmented Reality & Virtual Reality |
| | IoT Automation |
| | Ad-hoc & Sensor Networks |

**Professional Elective - V**

| | |
|---|---|
| | Embedded Software Design |
| | 5G & IoT Technologies |
| | Cognitive Computing |
| | Distributed Systems |
| | Edge Computing |

**Professional Elective – VI**

| | |
|---|---|
| | Industrial IoT |
| | Fog Computing |
| | Smart Sensor Technologies |
| | Digital Forensics |
| | Blockchain Technology |

## FINITE AUTOMATA AND COMPILER DESIGN

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.

**Course Outcomes:**

1. Graduates should be able to understand the concept of abstract machines and their power to recognize the languages.
2. Attain the knowledge of language classes & grammar relationship among them with the help of Chomsky hierarchy.
3. Ability to understand the design of a compiler given features of the languages.
4. Ability to implement practical aspects of automata theory.
5. Gain Knowledge of powerful compiler generation tools.

**UNIT - I**

**Formal Language and Regular Expressions:** Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.

**Context Free grammars and parsing**: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing.

**UNIT - II**

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

**Semantics**: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

**UNIT - III**

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

**UNIT - IV**

**Run time storage:** Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

**Code optimization:** Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

**UNIT - V**

**Code generation:** Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

**TEXT BOOKS:**

1. Introduction to Theory of computation. Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

**REFERENCE BOOKS:**

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Cengage Learning.
3. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V.Raghavan, TMH.
5. Engineering a Compiler, K.D.Cooper, L.Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation – Kamala Krithivasan and Rama R, Pearson.
7. Modern Compiler Design, D.Grune and others,Wiley-India.
8. A Text book on Automata Theory, S.F.B.Nasir, P.K.Srimani, Cambridge Univ. Press.
9. Automata and Languages, A.Meduna, Springer.

## MICROPROCESSORS & MICROCONTROLLERS

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. To familiarize the architecture of microprocessors and micro controllers.
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To understand the concepts of ARM architecture.
4. To study the basic concepts of Advanced ARM processors.

**Course Outcomes:** Upon completing this course, the student will be able to

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers.
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.

**UNIT - I:**

**8086 Architecture:** 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

**Instruction Set and Assembly Language Programming of 8086**: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

**UNIT - II:**

**Introduction to Microcontrollers:** Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

**8051 Real Time Control:** Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

**UNIT - III:**

**I/O And Memory Interface:** LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051. **Serial Communication and Bus Interface:** Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

**UNIT - IV:**

**ARM Architecture:** ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

**UNIT – V:**

**Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

**TEXTBOOKS:**

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani, TMH, 2nd Edition 2006.
2. ARM System Developer's guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

**REFERENCE BOOKS:**

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay, WILEY 2012.

## COMPUTER NETWORKS

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites:**

- A course on “Programming for problem solving”.
- A course on “Data Structures”.

**Course Objectives:**

1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

**Course Outcomes:**

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

**UNIT - I**

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

**UNIT - II**

Data link layer: Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols. Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

**UNIT - III**

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

**UNIT - IV**

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

**UNIT - V**

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

**TEXT BOOK:**

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

**REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

## DATABASE MANAGEMENT SYSTEMS

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites:** A course on “Data Structures”.

**Course Objectives:**

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

**Course Outcomes:**

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

**UNIT - I**

**Database System Applications:** A Historical Perspective, File Systems versus a DBMS**,** the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

**Introduction to Database Design**: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

**UNIT - II**

**Introduction to the Relational Model**: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.

Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

**UNIT - III**

**SQL: QUERIES, CONSTRAINTS, TRIGGERS:** form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

**Schema Refinement**: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

**UNIT - IV**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

**UNIT - V**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

**TEXT BOOKS:**

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, V edition.

**REFERENCE BOOKS:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education.*
3. Introduction to Database Systems, C. J. Date, *Pearson Education.*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

## ARCHITECTING SMART IOT DEVICES (Professional Elective – I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisite:** Embedded hardware design.

**Course Objectives:**

1. To understand the architectural overview of the Internet of Things (IoT).
2. To acquire skills on data acquisition and communication in IoT.
3. To understand the threats of IoT.

**Course Outcome:**

1. Understand how the IoT is different from traditional systems.
2. Demonstrate the revolution of internet in mobile and cloud.
3. Examine the architecture and operation of IoT.
4. Explore various tools and programming paradigms for IoT applications.
5. Develop an IoT prototype for real time scenario.
6. Understand the building blocks of IoT and security aspects.

**UNIT - I**

**Design Principles of IoT:** Design principles of connected devices, data acquiring organizing and analytics in IoT, system architecture of IoT.

**UNIT - II**

**Prototyping the Embedded Devices for IoT:** System hardware and prototyping, sensors and actuators for IoT, Radio module and wireless sensor network, gateways internet and web, software components.

**UNIT - III**

**Embedded Programming for IoT:** Programming connected devices, C and python for IoT, Case study: Temperature controller, Smart irrigation system.

**UNIT - IV**

**Embedded RTOS:** Program structure and real time, multitasking and scheduling, RTOS services, signals, semaphores, Nucleus SE, application timers, interrupts in nucleus ES, Nucleus SE initialization and starn1p.

**UNIT - V**

**Tools for IoT:** Introduction, chef puppet, NETCONF - YANG case studies.
**IoT physical Devices:** Basic building blocks of an IoT device and endpoints, family of ploT devices, pcDuino, Beagle bone black, cubie board, domain specific IoTs.

**TEXT BOOKS:**

1. Raj Kamal, Internet of Things, Architecture and Design Principles, lst edition, McGraw Hill Education, May 2017.
2. Arsheep Baga and Vijay Madisetti, Internet of Things: A Hands-On Approach, 1st Edition, Universities press, 2015.

**REFERENCE BOOKS:**

1. David Etter, IoT (Internet of Things Programming: A simple and fast way of Learning IoT, Kindle edition 2016.
2. Fei HU, Security and Privacy in Internet of Things (loTs): Models, Algorithms, and Implementations, 1st Edition, CRC Press, 2016.
3. Colin Walls, Embedded RTOS Design Insights and Implementation. 1st edition. Elsevier. December 2020.

## DATA ANALYTICS FOR IOT (Professional Elective – I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. To understand IoT Analytics and Challenges
2. To Analyze the IoT data to infer the protocol and device characteristics
3. To Explore and visualize data, and techniques to understand data quality

**Course Outcomes:**

1. Understand the fundamentals of IoT Analytics and Challenges
2. Understand and analyze IoT Devices and Networking Protocols
3. Apply IoT Analytics for the Cloud
4. Understand exploring and visualizing data

**UNIT - I:**

**Defining IoT Analytics and Challenges:** Introduction to IoT, applications, IoT architectures, introduction to analytics, IoT analytics challenges.

**UNIT - II:**

**IoT Devices and Networking Protocols:** IoT devices, Networking basics, IoT networking connectivity protocols, IoT networking data messaging protocols, Analyzing data to infer protocol and device characteristics.

**UNIT - III:**

**IoT Analytics for the Cloud:** Introduction to elastic analytics, Decouple key components, Cloud security and analytics, Designing data processing for analytics, Applying big data technology to storage.

**UNIT - IV:**

**Exploring IoT Data:** Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis.

**UNIT - V:**

**Data Science for IoT Analytics:** Introduction to Machine Learning, Feature engineering with IoT data, Validation methods, Understanding the bias–variance tradeoff, Use cases for deep learning with IoT data.

**TEXT BOOK:**

1. Minteer, Andrew, Analytics for the Internet of Things (IoT), Packt Publishing Ltd. July 2017, ISBN 9781787120730.

**REFERENCE BOOKS:**

1. Kai Hwang, Min Chen, Big-Data Analytics for Cloud, IoT and Cognitive Computing, Wiley.
2. Hwaiyu Geng, Internet of Things and Data Analytics Handbook, Wiley.
3. John Soldatos, Building Blocks for IoT Analytics Internet-of-Things Analytics, River Publishers Gerardus Blokdyk.
4. IoT Analytics A Complete Guide, 5starcooks.

## IOT SYSTEM ARCHITECTURES (Professional Elective – I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** Knowledge on concepts of IoT applications and IoT architectures, Event driven analysis and security testing IoT systems

**Course Outcomes:**

1. Understand IoT applications and IoT Architectures.
2. Learn about IoT devices and event driven analysis
3. Understand and analyze IIoT.
4. Understand safety and security testing of IoT systems

**UNIT - I:**

**The IoT Landscape:** What Is IoT? Applications, Architectures, Wireless Networks, Devices, Security and Privacy, Event-Driven Systems. **IoT System Architectures:** Introduction, Protocols Concepts, IoT-Oriented Protocols, Databases, Time Bases, Security.

**UNIT - II:**

**IoT Devices & Event-Driven System Analysis:** The IoT Device Design Space, Cost of Ownership and Power Consumption, Cost per Transistor and Chip Size, Duty Cycle and Power Consumption, Platform Design. **Event-Driven System Analysis:** Introduction, Motivating Example, IoT Network Model, Events, Networks, Devices and Hubs, Single-Hub Networks, Multi-hub Networks, Network Models and Physical Networks, IoT Event Analysis, Event Populations, Stochastic Event Populations, Environmental Interaction Modeling, Event Transport and Migration.

**UNIT - III**

**Industrial Internet of Things:** Introduction, Industry 4.0, Industrial Internet of Things (IIoT), IIoT Architecture, Basic Technologies, Applications and Challenges.

**UNIT - IV:**

**Security and Safety:** Introduction, Systems Security, Network Security, Generic Application Security, Application Process Security and Safety, Reliable-and-Secure-by-Design IoT Applications, Run-Time Monitoring, The ARMET Approach, Privacy and Dependability.

**UNIT - V:**

**Security Testing IoT Systems:** Introduction, Fuzz Testing for Security, White-Box Fuzzing, Black-Box Fuzzing, Fuzzing Industrial Control Network Systems, Fuzzing Modbus, The Modbus Protocol, Modbus/TCP Fuzzer.

**TEXT BOOKS:**

1. Dimitrios Serpanos, Marilyn Wol, Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, ISBN 978-3-319-69714-7.

**REFERENCE BOOKS:**

1. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015.
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.

## OPERATING SYSTEMS FOR IOT (Professional Elective – I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** Knowledge on Various Operating Systems of IoT.

**Course Outcomes:**

1. Understanding Free RTOS Techniques of Cube Software Tool.
2. Knowledge on Micro Python Features.
3. Understand and Acquire Knowledge on Micropython Hardware.
4. Apply Basic Data Structures and Functions of Micro Python.
5. Knowledge on Windows 10 For Iot Operating System.

**UNIT - I:**

**Processes, Tools, Toolchains and Hardware:** Design to Code -A Practical Approach, The Stm32cube Software Tool, The Practical Tool Set, The Stm32 Graphical Tool- Stm32cube Mx Details, The Stm32cubehal, Free RTOS Configuration in A Cube Project, The Stm32cube Cubeide Development Platform.

**UNIT - II:**

**Introducing Micropython:** Micropython Features, Micropython Limitations, What Does Micropython Run On?, Experimenting With Python On Your Pc, How Micropython Works, Off And Running With Micropython.

**UNIT - III:**

**Micropython Hardware:** Getting Started with Micropython Boards, Micropython-Ready Boards, Networking with The Pyboard, Getting Started with Wipy, Connecting to Your Wifi Network, Micropython-Compatible Boards, Other Boards, Breakout Boards and Add-Ons.

**UNIT - IV:**

**How To Program In Micropython:** Basic Concepts, Basic Data Structures, Statements, Modularization; Modules, Functions, And Classes, Learning Python By Example.

**UNIT - V:**

**Introducing the Windows 10 Iot Core:** Windows 10 Iot Core Features, Things You'll Need, Getting Started with Windows 10 Iot Core.

**TEXT BOOKS:**

1. Jim Cooling, Real-Time Operating Systems Book 2 - The Practice: Using Stm Cube, Freertos And the Stm32 Discovery Board (Engineering of Real-Time Embedded Systems) Jim Cooling, Isbn-10: 1973409933, Isbn-13: 978-1973409939.
2. Charles Bell, Micropython For the Internet of Things, A Beginner's Guide to Programming with Python on Microcontrollers, Apress, Isbn-13 (Pbk): 978-1-4842-3122-7, Isbn-13 (Electronic): 978-1-4842-3123-4.
3. Charles Bell Windows 10 For the Internet of Things 1st Edition, Apress, Isbn-13 (Pbk): 978-1-4842-2107-5 Isbn-13, (Electronic): 978-1-4842-2108-2.

**REFERENCE BOOKS:**

1. Gerardus Blokdyk, IOT Operating Systems A Complete Guide, Isbn-10: 0655416471, ISBN-13: 978-0655416470.
2. Klaus Elk, Embedded Software for The Iot, De Gruyter, Isbn: 9781547401048.

## DESIGN AND ANALYSIS OF ALGORITHMS (Professional Elective – I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites:**

1. A course on “Computer Programming and Data Structures”.
2. A course on “Advanced Data Structures”.

**Course Objectives:**

- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

**Course Outcomes:**

- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a specified application
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

**UNIT - I**

**Introduction:** Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

**Divide and conquer**: General method, applications-Binary search, Quick sort, Merge sort, Strassen’s matrix multiplication.

**UNIT - II**

**Disjoint Sets**: Disjoint set operations, union and find algorithms

**Backtracking**: General method, applications, n-queen’s problem, sum of subsets problem, graph coloring

**UNIT - III**

**Dynamic Programming**: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

**UNIT - IV**

**Greedy method:** General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

**UNIT - V**

**Branch and Bound**: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

**NP-Hard and NP-Complete problems**: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook’s theorem.

**TEXT BOOK:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

**REFERENCE BOOKS:**

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

## MACHINE LEARNING (Professional Elective – II)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Prerequisites**

1. Data Structures
2. Knowledge on statistical methods

**Course Objectives**

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

**Course Outcomes**

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

**UNIT - I**

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

**Decision Tree Learning –** Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

**UNIT - II**

**Artificial Neural Networks-1–** Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

**Artificial Neural Networks-2-** Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

**Evaluation Hypotheses –** Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

**UNIT - III**

**Bayesian learning –** Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

**Computational learning theory –** Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

**Instance-Based Learning**- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

**UNIT- IV**

**Genetic Algorithms** – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

**Learning Sets of Rules** – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

**Reinforcement Learning** – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

**UNIT - V**

**Analytical Learning-1**- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

**Analytical Learning-2-**Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

**Combining Inductive and Analytical Learning** – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

**TEXT BOOK:**

1. Machine Learning – Tom M. Mitchell, - MGH.

**REFERENCE BOOK:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

## REAL TIME SYSTEMS (Professional Elective – II)

**B.Tech. III Year I Sem.**

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**Prerequisite:** Computer Organization and Operating System

**Course Objectives:**

- To provide broad understanding of the requirements of Real Time Operating Systems.
- To make the student understand, applications of these Real Time features using case studies.

**Course Outcomes:**

- Be able to explain real-time concepts such as pre-emptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.
- Able describe how a real-time operating system kernel is implemented.
- Able explain how tasks are managed.
- Explain how the real-time operating system implements time management.
- Discuss how tasks can communicate using semaphores, mailboxes, and queues.
- Be able to implement a real-time system on an embedded processor.
- Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, Tiny Os

**UNIT – I**

**Introduction:** Introduction to UNIX/LINUX, Overview of Commands, File I/O,( open, create, close, lseek, read, write), Process Control ( fork, vfork, exit, wait, waitpid, exec).

**UNIT - II**

**Real Time Operating Systems:** Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

**UNIT - III**

**Objects, Services and I/O:** Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

**UNIT - IV**

**Exceptions, Interrupts and Timers:** Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

**UNIT - V**

**Case Studies of RTOS:** RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, and Tiny OS.

**TEXT BOOK:**

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011.

**REFERENCE BOOKS:**

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens.
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh.

## EMBEDDED HARDWARE DESIGN (Professional Elective – II)

**B.Tech. III Year I Sem.**

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**Course Objectives:** Knowledge on fundamental concepts on building hardware, Serial ports, AVR Microcontrollers and CAN.

**Course Outcomes:**

1. Understand and analyze Forth/Open Firmware, interaction with hardware and memory.
2. Discussion on how to add Peripherals Using SPI and $I^2C$.
3. Understand the significance of serial ports, IrDA and USB.
4. Understand various microcontrollers.

**UNIT – I**

**An Introduction to Computer Architecture** - Processors, Basic System Architecture, Interrupts, CISC and RISC, Digital Signal Processors, Memory and its types, Input/Output, DMA, Parallel and Distributed Computers, Embedded Computer Architecture.

**Forth/Open Firmware** - Introducing Forth, String Word, Stack Manipulation, Creating New Words, Comments, if…else, Loops, Data Structures, Interacting with Hardware and Memory, Forth Programming Guidelines.

**UNIT - II**

**Building Hardware** - Tools, Soldering, Quick Construction, Printed-Circuit Boards, Building it, JTAG

**Adding Peripherals Using SPI** - Serial Peripheral Interface , SPI-Based Clock/Calendar, SPI-Based Digital Potentiometer.

**Adding Peripherals Using $I^2C$** – Overview of $I^2C$, Adding a Real-Time Clock with $I^2C$, Adding a Small Display with $I^2C$.

**UNIT - III**

**Serial Ports** – UARTs, Error Detection, Old Faithful: RS-232C, RS-422, RS-485.

**IrDA** - Introduction to IrDA, An IrDA Interface, Other Infrared Devices.

**USB** – Introduction to USB, USB Packets, Physical Interface, Implementing USB Interface.

**UNIT - IV**

**Networks** – Controller Area Network (CAN), Ethernet.

**Analog** – Amplifiers, A to D conversion, Interfacing an External ADC, Temperature Sensor, Light sensor, Accelerometer, Pressure Sensor, Magnetic-Field Sensor, D to A conversion, PWM, Motor Control.

**The PIC Microcontrollers** - A Tale of Two Processors, Starting simple, A Bigger PIC, Motor control with a PIC.

**UNIT –V**

**The AVR Microcontrollers** - The AVR Architecture, The ATtiny15 Processor, Downloading Code, A Bigger AVR, Bus interfacing.

**68000-Series Computers** – Architecture, A Simple 68000-Based Computer.

**DSP-Based Controllers** - The DSP56800, A DSP56805-Based Computer, JTAG.

**TEXT BOOK:**

1. Designing Embedded Hardware, 2nd Edition by John Catsoulis, O'Reilly Media, Inc.

**REFERENCE BOOK:**

1. K. Shibu, Introduction to Embedded Systems, McGraw Hill Education.

## ENERGY SOURCES AND POWER MANAGEMENT (Professional Elective – II)

**B.Tech. III Year I Sem.**

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**Course objectives:** To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of Conventional energy Sources, Power distribution management system.

**Course Outcomes:**

1. Understand conventional energy sources and energy management systems.
2. Understand the significance of intelligent electronic devices.
3. Knowledge on distribution management system.
4. Understand the importance of smart meters.

**UNIT - I**

**Introduction to Energy Sources:** Conventional energy sources---Thermal, Hydel, Nuclear, Gas power stations (Single line diagrams –qualitative approach only).

**UNIT - II**

Renewable energy sources--Solar, wind, Tidal, wave, OTEC, Fuel cells, Geothermal, Energy Storage.

**UNIT - III**

**Energy Management System:** Energy Management System (EMS) – SMART GRID -Smart Grid Concept - Definitions and Need for Smart Grid – Functions – Opportunities – Benefits and challenges, Difference between conventional & Smart Grid, Smart substations - Substation Automation - Feeder Automation, SCADA – Remote Terminal Unit – Intelligent Electronic Devices – Protocols, Phasor Measurement Unit – Wide area monitoring protection and control, Smart integration of energy resources

**UNIT - IV**

**Distribution Management System:** Distribution Management System (DMS) – Volt / VAR control – Fault Detection, Isolation and Service Restoration, Network Reconfiguration, Outage management System, Customer Information System, Geographical Information System, Effect of Plug in Hybrid Electric Vehicles

**UNIT - V**

**Smart Meters:** Introduction to Smart Meters – Advanced Metering infrastructure (AMI), AMI protocols – Standards and initiatives, Demand side management and demand response programs, Demand pricing and Time of Use, Real Time Pricing, Peak Time Pricing.

**TEXT BOOKS:**

1. Stuart Borlase ‘Smart Grid: Infrastructure, Technology and Solutions’, CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, ‘Smart Grid: Technology and Applications’, Wiley, 2012.
3. Generation, distribution and utilization of Electric power, C.L. Wadhwa, New Age Publications.
4. Renewable sources and emerging technologies, D. P. kothari, K.C. iSingal, Rakesh Ranjan, PHI 2/e.

**REFERENCE BOOKS:**

1. Mini S. Thomas, John D McDonald, ‘Power System SCADA and Smart Grids’, CRC Press, 2015
2. Kenneth C. Budka, Jayant G. Deshpande, Marina Thottan, ‘Communication Networks for Smart Grids’, Springer, 2014.

**E BOOKS:**

1. https://books.google.co.in/books?isbn=1119969093
2. https://books.google.co.in/books?isbn=135123093X

## SOFTWARE ENGINEERING (Professional Elective – II)

**B.Tech. III Year I Sem.**

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**Course Objectives:**

- To provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

**Course Outcomes:**

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

**UNIT - I**

**Introduction to Software Engineering:** The evolving role of software, changing nature of software, software myths. **A Generic view of process:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. **Process models:** The waterfall model, incremental process models, evolutionary process models, the unified process.

**UNIT - II**

**Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. **System models:** Context models, behavioral models, data models, object models, structured methods.

**UNIT - III**

**Design Engineering:** Design process and design quality, design concepts, the design model.
**Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

**UNIT - IV**

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. **Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

**UNIT - V**

**Metrics for Process and Products:** Software measurement, metrics for software quality.
**Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

**REFERENCE BOOKS:**

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

## DATABASE MANAGEMENT SYSTEMS LAB

**B.Tech. III Year I Sem.**

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**Co-requisites:**

- Co-requisite of course “Database Management Systems”

**Course Objectives:**

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

**Course Outcomes:**

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

**List of Experiments:**

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

**TEXT BOOKS:**

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

**REFERENCES BOOKS:**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

## MICROPROCESSORS & MICROCONTROLLERS LAB

**B.Tech. III Year I Sem.**

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**Course Objectives:** To familiarize the architecture of microprocessors and micro controllers.

**Course Outcomes:**

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.

**List of Experiments:**

**Using 8086 Processor Kits and/or Assembler**

- Write Assembly Language Programs to 8086 to Perform
    1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
    2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

**Using 8051 Microcontroller Kit**

- Introduction to IDE
    1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions.
    2. Time delay Generation Using Timers of 8051.
    3. Serial Communication from / to 8051 to / from I/O devices.
    4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ.

**Interfacing I/O Devices to 8051**

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. Sequence Generator Using Serial Interface in 8051.
4. 8 bit ADC Interface to 8051.
5. Triangular Wave Generator through DAC interfaces to 8051.

**TEXT BOOKS:**

1. Advanced Microprocessors and Peripherals by A K Ray, Tata McGraw-Hill Education, 2006.
2. The 8051 *Microcontrollers*: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

**REFERENCE BOOKS:**

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay, WILEY 2012.

## ADVANCED COMMUNICATION SKILLS LAB

**B.Tech. III Year I Sem.** **L T P C**
**0 0 2 1**

**1. INTRODUCTION:**

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

**2. OBJECTIVES:**

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

**3. SYLLABUS**:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

**4. MINIMUM REQUIREMENT:**

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

**5. SUGGESTED SOFTWARE:**

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

**TEXT BOOKS:**

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

**REFERENCE BOOKS:**

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

## INTELLECTUAL PROPERTY RIGHTS

**B.Tech. III Year I Sem.**

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**UNIT – I**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT – II**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

**UNIT – III**

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT – IV**

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

**UNIT – V**

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

**TEXT & REFERENCE BOOKS:**

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.