RVR & JC COLLEGE OF ENGINEERING:: GUNTUR
M.Tech(Computer Science & Technology)
Syllabus w.e.f. 2017-18
CT 511 – Advanced Data Structures and Algorithms

Lecture: 4 Periods/Week Internal: 40 Marks
Practical: -- External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. Fundamentals of analysis of algorithm at depth.
2. Study of advanced data structures and its uses.
3. Analysis of problems from different domains.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Identify and use suitable data structures for given problem from different domains.
2. Appreciate the role of Linked List algorithms in solving variety of problems.
3. Appreciate the role of Optimization by using linear programming.
4. Analyze the various algorithms from different domains.
5. Understand the importance of advanced algorithms and techniques.

UNIT – I: [9 Periods]

UNIT – II: [10 Periods]
Linked List: Introduction, Linked lists, Representation of linked lists in Memory, Traversing a linked list, Searching a linked list, Memory allocation and Garbage collection, insertion into linked list, Deletion from a linked list, Types of linked list. Stack and Queue: Introduction, Array Representation of Stack, Linked List Representation of stack, Application of stack, Queue, Array Representation of Queue, Linked List Representation of Queue.

UNIT – III: [10 Periods]
Sorting Techniques: Notation and Concepts, Insertion Sort, Selection Sort, Bubble Sort, Merge Sorting, Heap Sort, Radix Sort, Quick Sort. Searching Techniques: Sequential Searching, Binary Searching, Search Trees, Hash-Table Methods, hash functions and relates analysis

UNIT – IV: [10 Periods]

UNIT – V: [10 Periods]
Dynamic Programing: matrix chain multiplication, cutting rod problem and its analysis Graph algorithms Bellman ford algorithm, Dijkstra algorithm, Johnson’s All pair shortest path algorithm for sparse graphs
Text Books:

References:
CT 512 - Data Base Technologies

Lecture : 4 Periods/Week
Practical: --

Course Learning Objectives: At the end of the Course Students will understand
2. Query Optimization, Transaction Processing, Active databases.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Use Data Models and understand the Database Context.
2. Know the Query optimization and concurrency control techniques.
3. Acquire the knowledge of Distributed Databases and Issues in Big Data.
4. Know the importance of Active Database systems and Deductive databases.
5. Know the Temporal databases, ontologies and multimedia databases.

UNIT - I : Relational Data Model, SQL, Data modelling using ER, Basics of Fundamental Dependencies and Normalization of Relational Databases.


UNIT - III: Distributed Database Concepts, NOSQL Databases and Big Data Storage Systems, Big Data Technologies based on MapReduce and Hadoop.


UNIT - V : The Latest Developments: Temporal databases - Basic concepts, Temporal data models, Temporal query languages, Ontologies - Ontology theoretical foundations, Environments for building ontologies, Structured, semi-structured and unstructured data, Multimedia databases.

Text Books:
References:
4. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley.
5. Database systems: A Practical approach to design, implementation and management, Connoly/Begg, Addison Wesley, 3rd edition.
CT 513 – Advanced Operating Systems

Lecture: 4 Periods/Week  
Practical: --  
Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
2. Concepts of Memory management, File management and Device management.
3. Concepts of Distributed Operating systems.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Design and implement inter process communication mechanisms.
2. Analyze, Design and implement Different CPU Scheduling algorithms and classical problems of synchronization.
3. Design and implement Memory management and Page replacement algorithms.
4. Know the concepts of Distributed Operating system.
5. Use files and files systems in different Operating Systems environment.

UNIT – I: [10 Periods]

UNIT – II: [10 Periods]
Process Scheduling: Scheduling Algorithms, Multiple -Processor Scheduling, Thread Scheduling.

UNIT – III: [10 Periods]

UNIT – IV: [10 Periods]

UNIT – V: [10 Periods]
Distributed Systems & Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Data-Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.

Case Study: Over View Of UNIX, LINUX, Windows NT, Android And IOS Operating systems.
Text Books:

References:
Course Learning Objectives: At the end of the Course Students will understand
1. Network security attacks and Symmetric Ciphers.
2. Concepts on Asymmetric ciphers like RSA and Elliptic curve algorithms.
3. Cryptography data integrity algorithms and network security.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Identify common network security vulnerabilities/attacks, classical and symmetric encryption schemes.
2. Know the cipher modes of operations and Public-key Cryptography.
3. Design Hash techniques and Digital signatures schemes.
4. Know the concepts of key management schemes and know the web security SSL/TLS.
5. Analyze wireless and IP Security technologies.

UNIT-I: [10 Periods]

UNIT-II: [10 Periods]
Block Cipher Operation: Multiple Encryption and Triple DES, Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode.

UNIT-III: [10 periods]
Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Message Authentication Codes, Security of MACs, HMAC.
Digital Signatures: Digital Signatures, Digital Signature Standard (DSS)
UNIT-IV: [10 periods]


UNIT-V: [10 periods]


Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.


Text Book:

Reference Books:
CT 522 – Distributed Systems

Lecture: 4 Periods/Week
Practical: --

Course Learning Objectives: At the end of the Course Students will understand
1. challenges and issues of incorporating distributed OS concepts
2. operating system principles, Distributed Computing techniques,
3. Synchronization, Processes and Shared Data access files.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Develop, test and debug RPC based client-server programs in Unix.
2. Design and build application programs on distributed systems.
3. Improve the performance and reliability of distributed programs.
4. Know newer distributed file systems for any OS.
5. Build and Use Distributed System

UNIT : I: (9 Periods)

UNIT 2: (10 Periods)
SYNCHRONIZATION IN DISTRIBUTED SYSTEMS: Clock synchronization - mutual exclusion - Election algorithms - Atomic transactions - Transaction model - Implementation and Concurrency control – Deadlocks.

UNIT 3: (10 Periods)
PROCESSES AND PROCESSORS IN DISTRIBUTED SYSTEMS: Threads - Threads design issues and implementation - System models - processor allocation - Design & implementation issues - Example processor allocation algorithms and Scheduling Fault tolerance–Types - Use of redundancy - Real time distributed systems - Real time Scheduling and communication

UNIT 4: (10 Periods)

UNIT 5: (10 Periods)
CASE STUDY Introduction to amoeba - Object and Capabilities - Process Management - Memory management - Group Communication – FLIP - Amoeba Servers - Introduction to MACH - Process Management - Memory management – Communication
Text Books:

Reference Books:
CT 523 – Machine Learning

Lecture: 4 Periods/Week  
Practical: --  
Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. goals and objectives of machine learning to build real-world systems.
2. classification and prediction techniques and to build systems that explore unknown and changing environments.
3. machine learning theory and models that exhibit high accuracies.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the basics of machine learning.
2. use machine learning to build real-world systems.
3. apply classification and prediction techniques.
4. build systems that explore unknown and changing environments.
5. know advanced machine learning techniques.

Unit-I: [9 Periods]

Unit-II: [9 Periods]
Dimensionality Reduction Centering on PCA, Clustering1: Mixture Models, K-Means and EM, Non-Parametric Methods Centering on kNN and Density Estimation.

Unit-III: [9 Periods]
Clustering2: Density-based Approaches, Decision and Regression Trees, Comparing Classifiers, Ensembles: Combining Multiple Learners

Unit-IV [9 Periods]
Support Vector Machines, More on Kernel Methods,

Unit-V: [9 Periods]
Belief Networks, Reinforcement Learning, Neural Networks, Computational Learning Theoroooxs
Text Books:

References:
Course Objectives: At the end of the Course Students will understand
d1. concepts of Finite automata theory and its applications.
2. concepts of Regular expressions, regular languages, Context-free grammars and languages.
3. designing principles of push-down automata, Turing machines and Undecidability.

Course Outcomes: After successful completion of this course, student will be able to
1. design finite state machines.
2. design $\epsilon$-NFA, conversion between Finite automata and Regular expressions.
3. apply pumping lemma for Regular languages, construct parse trees for CFG and ambiguous grammars.
4. construct push-down automata and apply pumping lemma for CFL.
5. design Turing Machines and analyze Undecidability.

UNIT – I:  
(15 Periods)
Automata: Introduction to Automata, The central concepts of automata theory - Alphabets, Strings, Languages.
Finite Automata: An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) - Definition of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA.
Finite Automata with $\epsilon$-transitions: Use of $\epsilon$-transition, notation for an $\epsilon$-NFA,$\epsilon$-closures, extended transitions and languages, Applications, Moore and mealy machines.

UNIT – II:  
(14 Periods)
Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.
Properties of Regular Languages: Proving languages are not regular -Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata - Minimization of DFA

UNIT – III:  
(14 Periods)
(Construction based treatment & proofs are excluded)
Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's.
UNIT – IV: (14 Periods)

Context free languages: Normal form's for context- Free grammars, the pumping lemma for context free languages.

Properties of Context free languages: closure properties for context free languages, Decision properties for CFL's.

UNIT – V: (13 Periods)

Introduction to Turing Machines: The Turing Machine, programming techniques for Turing machines.

Undecidability: a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post's Correspondence problem.

Text Book:


Reference Books:

CT 572 – Advanced Computer Architecture

Lecture: 4 Periods/Week
Practical: --

Course Learning Objectives: At the end of the Course Students will understand
1. high performance computing architectures.
2. concepts of system interconnection and performance measures.
3. pipelined processors and programming concepts for parallel computers.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the concepts of parallel computer models and its properties.
2. familiarize with interconnection architectures and performance measures.
3. analyze design structures for pipelined processors.
4. familiarize with scalable, multithreaded and dataflow architectures.
5. know the parallel programming models and code optimization techniques.

UNIT – I: [12 Periods]
Parallel Computer Models: The state of computing, Classification of parallel computers, Multiprocessors and Multicomputers, Multivector and SIMD computers.

Program and network properties: Conditions of parallelism, Data and resource Dependences, Hardware and Software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.

UNIT – II: [12 Periods]
System Interconnect Architectures: Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multi-port memory, Multistage and combining network.

Principles of Scalable Performance: Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws - Amdahl’s law for fixed load, Gustafson’s law for scaled problems, Memory Bounded Speedup Model.

UNIT-III: [12 Periods]
Pipelining: Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction.
**Pipelining:** Arithmetic Pipeline Design, Computer Arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines.

UNIT –IV: [12 Periods]
**MULTI Processors:** Multiprocessor System Interconnect, Cache Coherence and Synchronization Mechanisms, Message-passing Mechanism.

**Scalable, Multi-Threaded and Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading, Scalable and Multithreaded Architectures.

UNIT-V: [12 Periods]
**Parallel Models, Languages and Compilers:** Parallel Programming Models, Parallel Languages and Compilers, Dependence analysis of Data Arrays.

**Parallel Models, Languages and Compilers:** code optimization and Scheduling, Loop parallelization and pipelining.

**Text Book:**

**Reference Books:**
2. V.Rajaram & C.S.R.Murthy, "Parallel Computer", PHI.
CT 573 – Advanced Web Technologies

Lecture : 4 Periods/Week
Practical: --

Course Learning Objectives: At the end of the course the students will understand
1. the concepts to develop dynamic complex web applications.
2. the concepts of XML, Web servers, Ruby script and PHP.

Course Learning Outcomes: At the end of the course the students will be able to
1. design static web pages.
2. design dynamic Web documents using client side scripting.
3. develop XML applications and web documents with ruby script & PHP.
4. write java server side programs.
5. familiar with Semantic Web technologies.

UNIT –I: [9 Periods]
Introduction: XHTML, Cascading Style Sheets (CSS), JavaScript: Introduction to Scripting, Control Statements, Functions, Arrays, Objects

UNIT –II: [9 Periods]

UNIT –III: [12 Periods]
Web Servers: (IIS and Apache), Ruby on Rails, PHP: Introduction, Using Variables and Operators, Controlling Program Flow, Working with Arrays, Using Functions and Classes

UNIT –IV: [11 Periods]
SERVLETS: Overview, Servlet Implementaion, Servlet Configuration, Servlet Lifecycle, Servlet request, Servlet response, Session Tracking, Cookies.


UNIT –V: [9 Periods]

SEMANTIC WEB: Introduction, A Layered Approach, RDF, OWL.
Text Books:

References:
CT 574 – Advanced Software Engineering

Lecture: 4 Periods/Week
Practical: --

Internal: 40 Marks
External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. concepts of software engineering and its principles.
2. learn the verification and design of architectures.
3. know the advanced topics software process and its management.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know software engineering basics and qualities of software.
2. apply software engineering principles in development.
3. apply verification of software in software development.
4. apply the concepts of software production process.
5. know advanced topics such as management of software engineering.

UNIT-I:

Software: Its Nature and Qualities: Classification of Software Qualities, Representative Qualities and Quality Requirement in Different Application Areas.

UNIT – II:

Design and Software Architecture: The software Design Activity and its objectives, Modularization Techniques, Handling Anomalies.

UNIT – III:
Verification: Goals and requirements of verification, Approaches to verification, Testing, Analysis, Symbolic Execution, Model Checking, Putting it All Together, Debugging.
UNIT – IV:  


UNIT – V:  


Text Books:

Reference Books:
6. Software Engineering with Abstraction, Berzins and Luqi
CT 575 – Artificial Intelligence

Lecture: 4 Periods/Week
Practical: --

Internal: 40 Marks
External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. concepts of artificial intelligence.
2. problem solving techniques using Artificial Intelligence.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. identify problems that are amenable to solve by AI methods.
2. Identify appropriate AI methods to solve a given problem.
3. formalize a given problem in the language/framework of different AI methods.
4. implement basic AI algorithms.
5. design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

UNIT I: [9 Periods]
INTRODUCTION TO AI AND PRODUCTION SYSTEMS: Introduction to AI-Problem formulation, Problem. Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II: [9 Periods]
REPRESENTATION OF KNOWLEDGE: Game Playing - Knowledge representation, Knowledge Representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

UNIT III: [9 Periods]
KNOWLEDGE INERENCE: Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT IV: [9 Periods]

UNIT V: [9 Periods]
EXPERT SYSTEMS: Expert systems - Architecture of expert systems, Roles of expert systems –

Text Books:

References:
4. http://nptel.ac.in/
Course Learning Objectives: At the end of the Course Students will understand
1. basic theory and algorithms those are widely used in digital image processing.
2. basic approaches in digital image processing.
3. concepts of color image processing, shape representation and description.

Course Learning Outcomes: After successful completion of this course, student will be able to familiarize with
1. overview of image processing systems, Image formation and perception, Continuous and digital image representation.
2. image enhancement in spatial and frequency domain filtering.
3. image compression and image segmentation.
4. the mathematical morphology and shape representation methods.
5. color image processing and object recognition.

UNIT – I: [10 Periods]


UNIT - II: [18 Periods]


UNIT – III: [20 Periods]
Image Compression: Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of principal components for Description.

UNIT-V: Color Image Processing: Color fundamentals, color models, Pseudo color image processing, Basics of color image processing, color image smoothening, color image sharpening, Noise in color images.

Object Recognition: Patterns and Patterns classes, Recognition based on Decision-Theoretic Models, Matching shape Numbers, string Matching, Syntactic Recognition of Strings, and Syntactic Recognition of Trees.


CT 577 – Speech Processing and Synthesis

Lecture : 4 Periods/Week
Practical: --

Course Learning Objectives: At the end of the Course Students will understand
1. speech production and related parameters of speech.
2. techniques to analyze the speech.
3. speech modeling procedures and implementation issues.

Course Learning Outcomes: After Successful Completion of this course, student will be able to
1. know the fundamentals of speech and model speech production system.
2. extract and compare different speech parameters.
3. choose an appropriate statistical speech model for a given application.
4. design a speech recognition system.
5. use different speech synthesis techniques.

UNIT I: BASIC CONCEPTS [10 Periods]
Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – Acoustics of speech production;

UNIT II: SPEECH ANALYSIS [10 Periods]

UNIT III: SPEECH MODELING [8 Periods]
Hidden Markov Models: Introduction, Discrete –Time Markov processes, Extensions to Hidden Markov Models, Types of HMM’s, continuous observation Densities in HMMs, Autoregressive HMMs, Variants on HMM Structures-Null Transitions and Tied States, Comparisons of HMMs, Implementation issues for HMMs, HMM system for Isolated word Recognition.

UNIT IV: SPEECH RECOGNITION [10 Periods]
Large Vocabulary Continuous Speech Recognition: Introduction, Subword Speech units, Subword Unit Models Based on HMMs, Training of Subword Units, Language Models for Large Vocabulary Speech Recognition, Statistical Language Modeling, Perplexity of the Language Model, Overall Recognition System Based on Subword Units, Context-Dependent Subword Units.
UNIT V: SPEECH SYNTHESIS [10 Periods]

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Text Books:

References:
CT 578 – Multimedia Systems

Lecture: 4 Periods/Week  Internal: 40 Marks
Practical: --  External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
2. importance, use and issues in Compression Techniques.
3. developments in Multimedia Communications for Entertainment Networks.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. represent information in Multimedia Communications.
2. address Basic Text and Image Compression techniques.
3. apply and use Audio and Video Compression Standards.
4. apply the knowledge of selecting and using protocols ensuring Quality-of-Service(QoS) in developing multimedia applications.
5. know the entertainment functions and support hardware.

UNIT-I [9 Periods]
Multimedia Communications – Multimedia information representation, Multimedia Networks, Multimedia Applications.


UNIT – II [9 Periods]
Text and Image Compression – Compression Principles, Text Compression, Image Compression.

UNIT – III [9 Periods]
Audio and Video Compression – Audio Compression and Video Compression.

UNIT – IV [9 Periods]
Standards for Multimedia Communications – Reference Models, Standards related to Interpersonal Communications, Standards related to interactive applications over the internet.

UNIT – V [9 Periods]
Entertainment Networks – Cable TV Networks, Satellite Television Networks, Terrestrial Television Networks, High-Speed PSTN access Technologies.
Application Support Functions – ASN.1, Security, Data Encryption, Non repudiation, Authentication, Public Key Certification Authorities.

Text Books:
**Reference Books:**

CT 579 – Information Security

Lecture: 4 Periods/Week            Internal: 40 Marks
Practical: --                      External: 60 Marks

Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. SDLC for information security implementation.
2. issues related to legal, ethical, and professional in information security.
3. Risk control Security technology architectures and tools.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the security system development life cycle
2. familiar with the legal, ethical, and professional issues in information security.
3. apply Risk control and management strategies.
4. know firewalls and firewall architectures.
5. familiarize with security technologies and tools.

UNIT I: [9 Periods]


UNIT II: [9 Periods]


UNIT III: [9 Periods]


UNIT IV: [9 Periods]
Security Technology: Introduction, Firewalls and VPNs.

Firewall Architectures: Firewall Architectures, Protecting Remote Connections.
UNIT V: [9 Periods]


**Other Security Tools**: Scanning and Analysis Tool, Biometric Access Tools.

**Text Book**

**References**:
CT 580 – Web Services

Lecture: 4 Periods/Week Internal: 40 Marks
Practical: -- External: 60 Marks
Credits: 4

Course Objectives: At the end of the Course Students will understand
1. web service technologies.
2. description language for Web services.
3. publish and consume web services.

Course Outcomes: After successful completion of this course, student will be able to
1. know the fundamentals of web services.
2. create XML namespaces and schemas for Web-services.
3. describe and provide information about Web Services.
4. write SOAP requests and responses to access web services.
5. write UDDI structures to publish and consume web services.

UNIT I: [10 Periods]

UNIT II: [10 Periods]

UNIT III: [10 Periods]

UNIT IV: [10 Periods]
Accessing Web Services(SOAP): The SOAP Specification, SOAP Envelope, SOAP Header, SOAP Body, SOAP Faults, RPC Convention, SOAP Message Processing, SOAP Use of Namespaces, SOAP Multipart MIME Attachments, SOAP in the Context of Existing Systems.

UNIT V: [10 Periods]
Text Book:

Reference Books:
CT 581 – Wireless Networks

Lecture: 4 Periods/Week Internal: 40 Marks
Practical: -- External: 60 Marks

Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. wireless networks, protocol stack and standards.
2. fundamentals of 3G Services, its protocols and applications.
3. evolution of 4G Networks, its architecture and applications.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the latest 3G/4G and WiMAX networks and its architecture.
2. design routing mechanism in mobile ad-hoc network.
3. know the fundamentals of Transport Layer Protocols.
4. Know the wireless network environment for any application using latest wireless protocols and standards.
5. Know the different type of applications for smart phones and mobile devices with latest network strategies.

UNIT I: Wireless LAN [9 Periods]

UNIT II: Mobile Network Layer [9 Periods]

UNIT III: Mobile Transport Layer [9 Periods]

UNIT IV: Wireless Wide Area Network [9 Periods]
UNIT V: 4G Networks


Text Books:

References:
CT 582 – Embedded Systems and Applications

Lecture: 4 Periods/Week  
Practical: --

Course Learning Objectives: At the end of the Course Students will understand
1. techniques to specify and develop embedded systems.
2. embedded platform architectures to design systems that support specific applications.
3. testing and debugging strategies.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. implement basic digital building blocks using simulation software.
2. know IPC & Microcontroller.
3. recognize the key features of 8051.
4. develop software systems for embedded devices.
5. design, test and evaluate embedded solutions to real world problems.

UNIT-I: [Periods: 11]
Introduction to an embedded systems design & RTOS:
Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

UNIT – II: [Periods: 11]
Overview of IPC & Microcontroller
Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks. Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, the program Counter and ROM Spaces in the 8051.
UNIT – III:  [Periods: 11]
Overview of Microcontroller:
Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

UNIT – IV:  [Periods: 11]
Communication with 8051:
Basics of Communication, Overview of RS-232, I²C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051.

UNIT – V:  [Periods: 11]
Interfacing with 8051:
Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

Text Books:

Reference Books:
CT 583 – Big Data Analytics

Lecture: 4 Periods/Week  
Practical: --  
Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. Data Mining and Massive Data Management.
2. Mining of Massive Datasets using different Techniques.
3. Internet Recommendations and Social Network Analysis.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know data mining in distributed file management environment.
2. apply the similarity principle on massive datasets.
3. know the key technical issues of Data Streams.
4. recognize the importance of link analysis and frequent item sets.
5. apply recommendation systems and social network graphs.

UNIT – I  
[10 Periods]

UNIT – II  
[10 Periods]
Finding Similar Items: Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Finding Similar Items, Locality-Sensitive Hashing for Documents, Distance Measures, the Theory of Locality-Sensitive Functions.

UNIT – III  
[10 Periods]

UNIT—IV  
[10 Periods]

Frequent Item Sets: The Market-Basket Model, Market Baskets and the A-Priori Algorithm, Handling Larger Data Sets in Main Memory.

UNIT – V  
[10 Periods]

Social-Network Graphs: Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs.

Text Book:
References:
CT 584 – Cloud Computing

Lecture: 4 Periods/Week  
Practical: --  
Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. distributed concepts and Virtualization.
2. Cloud Programming and Cloud Services.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. use Cloud Computing environment Data Models and understand the Database Context.
2. Apply the hardware and software concepts and architecture of cloud computing.
3. Contrast the key technical and commercial issues concerning cloud computing versus traditional software models.
4. recognize peer-to-peer computing and overlay networks.
5. know the application development in Cloud Environment.

UNIT – I: [10 Periods]

UNIT – II [10 Periods]
VIRTUAL MACHINES AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS: Implementation levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory and I/O devices.

UNIT III: [10 Periods]

UNIT IV: [10 Periods]
UNIT V:


Text Books:

References:
CT 585 – Internet of Things

Lecture: 4 Periods/Week Internal: 40 Marks
Practical: -- External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. issues, policy and challenges in the IoT.
2. components, protocols and managing the resources in the IoT.
3. deploying the resources in an IoT environment.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the components of IoT.
2. develop Programs for the IoT.
3. manage resources in IoT.
4. model the Internet of things for business.
5. develop applications for the web of things.

UNIT I: INTRODUCTION [9 Periods]

UNIT II: PROGRAMMING THE MICROCONTROLLER FOR IOT [9 Periods]

UNIT III: RESOURCE MANAGEMENT IN THE INTERNET OF THINGS [9 Periods]
Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture - The Role of Context - Design Guidelines -Software Agents for Object - Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the behaviour of Objects
UNIT IV: BUSINESS MODELS FOR THE INTERNET OF THINGS

[9 Periods]

UNIT V: FROM THE INTERNET OF THINGS TO THE WEB OF THINGS:

[9 Periods]

TEXT BOOKS:
1. Charalampos Doukas, Building Internet of Things with the Arduino, Create space, April 2002. (Unit I & II).
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011. (Unit III to V)

REFERENCES:
CT 586 – Mobile Computing

Lecture: 4 Periods/Week  
Practical: --  

Course Learning Objectives: At the end of the Course Students will understand

1. basic concepts of mobile communication.
2. architectures and protocols used for mobile communication/computing.
3. mobile device databases and operating systems.

Course Learning Outcomes: After successful completion of this course, student will be able to know

1. the basics of mobile communication and computing.
2. the architectures for mobile computing.
3. the protocols of the different layers in mobile communication.
4. mobile TCP.
5. the operating systems and databases suitable for the mobile devices.

UNIT I:  


UNIT II:  


UNIT III:  

MOBILE TRANSPORT LAYER: Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP.
UNIT IV: [10 Periods]
**MOBILE TCP:** Other Methods of TCP-Layer Transmission for Mobile Networks, TCP Over 2.5G/3G Mobile Networks.

UNIT V: [10 Periods]
**DATABASES:** Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaption, Transaction Models, Query Processing, Data Recovery Process.

**MOBILE OPERATING SYSTEMS:** Operating Systems, PalmOs, Windows CE, Symbian OS, Linux for Mobile Devices.

**Text Book:**

**Reference Books:**
CT 587 – Agile Software Development

Lecture: 4 Periods/Week
Practical: --

Internal: 40 Marks
External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. principles and practices associated with agile development methods.
2. agile methods for distributed projects.
3. in-depth explorations of agile development.

Course Learning Outcomes: After successful completion of this course, student will be able to familiarize with
1. various agile development methods.
2. inception phase of agile development.
3. technical strategy and release planning with agile development.
4. construction and transition phases of agile development.
5. Scrum and Sprint agile methodologies in system development.

UNIT – I: [10 Periods]


UNIT – II: [10 Periods]
The Inception Phase: How the Inception Phase Works, Aligning with the Rest of the Enterprise, Securing Funding, Other Inception Activities, When Do You Need an Inception Phase?, Inception Phase Patterns, Inception Phase Anti-Patterns.


Identifying the Initial Scope: Choosing the Appropriate Level of Initial Detail, Choosing the Right Types of Models, Choosing a Modeling Strategy, Choosing a Work Item Management Strategy.

UNIT – III: [10 Periods]
Identifying an Initial Technical Strategy: Choosing the Right Level of Detail, Choosing the Right Types of Models, Choosing a Modeling Strategy, Architecture throughout the Lifecycle.

UNIT – IV


The Transition Phase: How the Transition Phase Works, Planning the Transition Phase, Ensuring Your Production Readiness, Preparing Your Stakeholders for the Release, Deploying the Solution, Transition Phase Patterns, Transition Phase Anti-Patterns.

UNIT – V

Sprints: Timeboxed, Short Duration, Consistent Duration, No Goal-Altering Changes, Definition of Done.

Text Books:

Reference Books:
CT 588 – Data Engineering

Lecture: 4 Periods/Week  
Practical: --  
Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. basics of data warehousing and Data mining.  
2. association rule mining, and classification techniques.  
3. clustering and applications of data mining on complex data objects.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. apply fundamental concepts for the construction of Data Warehouse.  
2. familiarize with Data Mining concepts.  
3. extract association rules from transactional databases.  
4. demonstrate different classification techniques.  
5. implement various clustering techniques and and data mining concepts on complex data objects.

UNIT-I:  
[12 Periods]  
Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts- Data Warehouse Modeling: Data Cube and OLAP-Data Warehouse Design and Usage- Data Warehouse Implementation.

Data Preprocessing: An overview of Data Preprocessing- Data cleaning- Data Integration- Data Reduction- Data Transformation and Data Discretization.

UNIT-II:  
[12 Periods]  
Getting to know Your Data: Data Objects and Attribute Types- Basic Statistical Descriptions of Data- Measuring Data Similarity and Dissimilarity.

Introduction: Why Data Mining- What is Data Mining?-What Kinds of Data can be mined?- What Kinds of Patterns can be mined?- Which Technologies are used?- Major Issues in Data Mining.

UNIT-III:  
[15 Periods]  
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts- Frequent Item set Mining Methods: Apriori Algorithm, Generating Association Rules, Improving the efficiency of Apriori, FP Growth Approach for Mining Frequent Item Sets, Mining Frequent Item Sets using Vertical Data Format Method.
Advanced Pattern Mining: Mining Multilevel Associations- Mining Multidimensional Associations- Mining Quantitative Association Rules-Mining Rare Patterns and Negative Patterns- Constrained based Frequent Pattern Mining.
UNIT- IV: [15 Periods]
**Classification:** Basic Concepts- Decision tree induction- Bayes Classification Methods- Rule-Based Classification- Model Evaluation and Selection- Techniques to Improve Classification Accuracy.

**Advanced Methods in Classification:** Bayesian Belief Networks-Classification by Backpropagation-Classification by Support Vector Machines-Lazy Learners-Other Classification Methods.

UNIT- V: [12 Periods]

**Data Mining Trends:** Mining Sequence Data- Mining Graphs and Networks- Mining Other Kinds of Data- Data Mining Applications.

**Text Book:**
1. Data Mining Concepts & Techniques, Jiawei Han, MichelineKamber, and Jian Pei, 3/e, Morgan Kaufmann Publishers.

**Reference Books:**
1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley.
CT 589 – Evolutionary Computation

Lecture: 4 Periods/Week  
Practical: --

Internal: 40 Marks  
External: 60 Marks  
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. basics of Genetic and Evolutionary Algorithms.
2. different Evolutionary Algorithms.
3. evolutionary Algorithms with Multi Objective Functions.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. identify Algorithms suitable for solving certain Evolutionary computation problems.
2. know the usage of operators in Evolutionary Computation.
3. familiar with various Evolutionary Computation Techniques.
4. apply Evolutionary Computing Techniques for optimization.
5. know the Evolutionary Algorithms with Multi Objective Functions.

UNIT I:  
INTRODUCTION: History, Inspiration from biology: Darwinian evolution - Genetics, Need of evolutionary computing.


UNIT II:  
VARIANTS OF EVOLUTIONARY COMPUTATION: EA vs traditional methods, Representation, Mutation, Recombination, Population models, Parent selection, Survivor selection.

UNIT III:  

UNIT IV:  
OTHER EVOLUTIONARY TECHNIQUES: Ant Colony Optimization (ACO): Real to artificial ants - ACO algorithm - Convergence proofs, Particle Swarm Optimization (PSO): Principles of bird flocking and fish schooling - PSO algorithm - Variants of PSO, Application: TSP.
UNIT V: [9 Periods]
MULTIOBJECTIVE EVOLUTIONARY OPTIMIZATION: Introduction, Pareto optimality, Multi-Objective evolutionary algorithms.

TEXT BOOK:

REFERENCES:
CT 590 – Cyber Security

Lecture: 4 Periods/Week  Internal: 40 Marks
Practical: --  External: 60 Marks

Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. Cyber security policies and Evolutions, Cyber security objectives and decision makers.
2. Cyber governance issues and conflict issues
3. Cyber management and Infrastructure issues.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. Know polices, laws & regulations and counter measures.
2. Know the concepts of security management goals, security frameworks and security policy objectives.
3. Analyze copyright & Trademarks, Email and Messaging.
4. Analyze user issues and conflict issues.
5. Analyze risk management in various sectors and Infrastructure issues.

UNIT – I: [10 Periods]

Cyber Security Evolution: Productivity, Internet, e-commerce, Counter Measures, Challenges.

UNIT – II: [10 Periods]

Guidance for Decision Makers: Tone at the Top, Policy as a Project.

UNIT – III: [10 Periods]

Cyber Governance Issues: Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging.

UNIT – IV: [10 Periods]
Cyber User Issues: Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geo location, Privacy.

Cyber Conflict Issues: Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

UNIT – V: [10 Periods]

Cyber Infrastructure Issue: Banking and finance, Health care, Industrial Control systems.
Text Books:


References:

CT 591 – Fuzzy Set Theory and Applications

Course Learning Objectives: At the end of the Course Students will understand
1. basics of the fuzzy sets.
2. extension principles and relations on fuzzy sets.
3. applications of the fuzzy set theory.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. know the basic operations of the fuzzy sets.
2. know various types of fuzzy sets.
3. familiarize with the principles of the fuzzy sets, relations and fuzzy graphs.
4. acquainted with functions on fuzzy sets and modeling of uncertainty.
5. familiarize with applications of fuzzy sets and expert systems.

UNIT-I: [12 Periods]

Fuzzy Sets-Basic Definitions: Basic Definitions, Basic Set-Theoretic Operations for Fuzzy Sets.

UNIT-II: [12 Periods]

Fuzzy Measures and Measures of Fuzziness: Fuzzy Measures, Measures of Fuzziness.

UNIT-III: [12 Periods]

Fuzzy Relations and Fuzzy Graphs, Fuzzy Relations on Sets and Fuzzy Sets, Compositions of Fuzzy Relations, Properties of the Min-Max Composition, Fuzzy Graphs, Special Fuzzy Relations.

UNIT-IV: [12 Periods]
Fuzzy Analysis, Fuzzy Functions on Fuzzy Sets, Extrema of Fuzzy Functions, Integration of Fuzzy Functions, Integration of a Fuzzy Function over a Crisp Interval, Integration of a (Crisp) Real-Valued Function over a Fuzzy Interval, Fuzzy Differentiation.
**Uncertainty Modelling:** Application-oriented Modelling of Uncertainty, Causes of Uncertainty, Type of Available Information, Uncertainty Methods, Uncertainty Theories as Transformers of Information, Matching Uncertainty Theory and Uncertain Phenomena.

**UNIT-V:**

**Fuzzy Logic and Approximate Reasoning:** Linguistic Variables, Fuzzy Logic, Approximate and Plausible Reasoning, Fuzzy Languages.


**Text Book:**

**Reference Books:**
CT 592 – Natural Language Processing

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<td>External: 60 Marks</td>
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Course Learning Objectives: At the end of the Course Students will understand

1. concepts and techniques for natural language processing.
2. syntax and semantics in NLP.
3. computational models for natural language processing.

Course Learning Outcomes: After successful completion of this course, student will be able to

1. determine the structural components of sentences for a given Grammar.
2. represent context-independent meaning of a sentence.
3. know semantic interpretation of the sentence.
4. identify the ambiguity and possible interpretations of a sentence.
5. generate contextual representation.

UNIT-I: [9 Periods]

INTRODUCTION TO NATURAL LANGUAGE UNDERSTANDING: Applications of Natural Language Understanding, Evaluating language Understanding Systems, The Different levels of Language Analysis.

GRAMMARS AND PARSING: Grammars and Sentence Structure, Top- down parser, Bottom up chart parser, Transition network grammars, Top-down chart parsing, finite state models and Morphological processing.

UNIT-II: [9 Periods]


GRAMMARS FOR NATURAL LANGUAGE: Auxiliary Verbs and Verb Phrases, Movement Phenomenon In Language, Handling Questions in Context-Free Grammars.

UNIT-III: [9 Periods]

TOWARD EFFICIENT PARSING: Human preferences in parsing, Encoding Uncertainty-Shift-Reduce Parsers, A Deterministic Parser.

UNIT-IV: [9 Periods]

SEMANTICS AND LOGICAL FORM: Semantics and Logical Form Word Senses and Ambiguity, The Basic Logical Form Language, Encoding Ambiguity in the Logical Form, Verbs and States in Logical Form.

LINKING SYNTAX AND SEMANTICS: Semantic Interpretation and Compositionality, A Simple grammar and Lexicon with Semantic Interpretation, Prepositional Phrases and Verb Phrases.

Unit-V: [9 Periods]


Text Book:

Reference Books:
1. Daniel Jurafsky, James H. Martin, Speech and Language Processing,
CT 593 – Software Architecture

Lecture: 4 Periods/Week  Practical: --  Internal: 40 Marks  External: 60 Marks  Credits: 4

Course Learning Objectives: At the end of the Course Students will understand
1. software architectural requirements and drivers.
2. architectural styles and views.
3. architectures for emerging technologies.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. develop software architecture for business cycle.
2. identify key architectural quality.
3. use Architectural Description Language.
4. reuse Architectural styles and views in an organization.
5. reuse Architectural assets – community wise.

UNIT-I: [10 Periods]


UNIT – II: [10 Periods]


UNIT – III: [10 Periods]
Architecture Description Languages: Architecture Description Languages Today, Capturing Architectural Information in an ADL, How Do ADLs Help System Development?, Choosing and ADL.

Architecture-Based Development: Forming the Team Structure, Creating a Skeletal System, Exploiting Patterns in Software Architecture.

UNIT – IV: [10 Periods]
UNIT –V:  


Text Books:

Reference Books:
CT 594 – Semantic Web

Lecture: 4 Periods/Week Internal: 40 Marks
Practical: -- External: 60 Marks
Credits: 4

Course Learning Objectives: At the end of the Course Students will understand concepts of
1. Traditional and Semantic Web.
2. Web Ontology Language and Inference rules.
3. Ontology’s and Semantic Web search engine and services.

Course Learning Outcomes: After successful completion of this course, student will be able to
1. familiarize with Semantic Web technologies.
3. analyze Semantic web structures by using Ontology Web Language and Inference rules.
4. use Ontologies in Semantic Web-system.
5. develop Semantic Web applications.

UNIT I: [10 Periods]
The Semantic Web: Vision, Semantic Web Technologies, A Layered Approach
The world of the semantic web: WWW-meta data-Search engine-Search engine for traditional web-
Semantic web-Search engine for semantic web-Traditional web to semantic web.

UNIT II: [10 Periods]
Describing Web Resources: RDF, Basic Ideas, XML Based Syntax RDF Schema RDF and RDF

Schema in RDF Schema: Basic Ideas, The Language, An Axiomatic Semantics for RDF and RDF Schema,
A Direct Inference System for RDF and RDFS, Querying in RQL.

UNIT III: [10 Periods]
Web Ontology Language OWL: The OWL Language, OWL in OWL, Future Extension

Logic and Inference-Rules: Monotonic Rules- syntax, semantics, Rule Markup in XML, Non monotonic
Rules- syntax, semantics, Rule Markup in XML

UNIT IV: [10 Periods]
Ontology Engineering: Constructing Ontologies Manually, Reusing Existing Ontologies,

Using Semiautomatic Methods: OnToKnowledge Semantic Web Architecture, Application project

UNIT V: SEMANTIC WEB SERVICES [10 Periods]
Swoogle: Swoogle, FOAF, Semantic markup Issues, prototype system, Design of Semantic web search engine, prototype system-case study.
Semantic Web Services: Semantic web services, OWL-S, Upper ontology, WSDL-S, OWL-S to UDDI mapping, Design of the search engine, implementations
Text Books:
1. Antoniou Grigoris, Groth Paul, Harmelen Frank Van, Hoekstra Rinke, “A Semantic Web Primer”, 3ed, PHI pub. (Unit-I to IV)

Reference Books:
CT 551 – Advanced Programming Lab

Lecture: --  
Practical: 3 Periods/Week  

Internal: 40 Marks  
External: 60 Marks  
Credits: 2

CT 552 – Data Base Technologies Lab

Lecture: --  
Practical: 3 Periods/Week  

Internal: 40 Marks  
External: 60 Marks  
Credits: 2

CT 561 – Machine Learning Lab

Lecture: --  
Practical: 3 Periods/Week  

Internal: 40 Marks  
External: 60 Marks  
Credits: 2

CT 562 – Industry Related Lab

Lecture: --  
Practical: 3 Periods/Week  

Internal: 40 Marks  
External: 60 Marks  
Credits: 2

NOTE: Laboratory work will be based on concerned subject syllabus with minimum 10 experiments to be incorporated. The self-study contents will be declared at the commencement of semester. Around 50% of the Questions will be asked from self study contents.
The college team selectors will be conducted in the respective courts on below mention dates at 2.30 PM. All the ME and ECE students of our college are announced that APSSDC in association with Festo industry is organizing a Roadshow by Mobile Expotainer-Innovation on Wheels. View Details All the final year students of B.Tech (CSE, ECE, EEE & IT) are hereby informed that M/s. RVR & JC College of Engineering (RVRJCCE) was established in the year 1985. It is a private and self-financing institution. It was founded by the Nagarjuna Educational Society. The campus is connected to the national highway-5 (Guntur to Chennai Highway) near CPI Colony at Chowdavaram in Guntur, the district of Andhra Pradesh. The campus is located in the outskirt of the city and well-connected by the road to nearby cities and towns. Programmes: The RVRJCCE campus is conducting the B.Tech programme in eight engineering disciplines, M.Tech programme in six engineering specializations, MCA programme and an MBA programme.