ANIL NEERUKONDA
INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

Affiliated to Andhra University

M.Tech

(Computer Science & Engineering Department)

Academic Regulations

Curriculum & Syllabi

ACCREDITED BY NBA & NAAC WITH 'A' GRADE

ACADEMIC REGULATIONS FOR M.TECH PROGRAMME UNDER

AUTONOMOUS STATUS

W.E.F. THE ADMITTED BATCH OF 2015-16

I. Admissions:

Admissions into first year of M.Tech Programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh.

II. Programmes Offered:

The following are the M.Tech. programmes offered by the Institute. 01. Control Systems Engineering – EEE Department

02. Computer Science and Technology – CSE Department

03. Communication Systems – ECE Department

04.Machine Design – Mech. Engg Department

III. Structure Of The M. Tech. Programme:

The normal duration of the course is 2 academic years for M.Tech Degree. Candidates should pursue a regular course of study, as detailed below, for not less than two academic years which consists of 4 semesters and should fulfil the academic requirements and pass all the prescribed examinations for the award of the degree.

The curriculum of M.Tech programme is designed to have a total of about 80 credits of which a student should acquire a minimum of 74 credits to get the degree awarded. If a student earns all the total credits, then the best 74 credits are considered to determine the final CGPA. However, the credits which a student can forego will be in accordance with the mandatory courses and electives offered by the individual departments.

IV. Duration of the Programme:

The duration of the programme is 2 academic years consisting of 2 semesters in each academic year. A student is permitted to complete the Programme in a stipulated time frame of 4 consecutive academic years from the date of initial admission and if fails will forfeit his seat in M. Tech Programme.

V. Medium of Instruction:

The medium of instruction and examination is English.

VI. Minimum Instruction Days:

Each semester normally consists of a minimum of 16 weeks of instruction.

VII. Academic Calendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute, as approved by the Academic Council.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks each for theory and practical courses.

(a) Theory Course:

For all lecture based theory courses, the assessment shall be for 40 marks through internal evaluation and 60 marks through external semester-end examination of three hours duration.

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks are assigned for assignments, 5 marks are assigned for projects/ case studies /quiz/tests and 5 marks are assigned for attendance. The average of 2 internal-mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) External evaluation:

The question paper shall be set externally and the answer scripts are valued through a double valuation system.

The average of the two valuations will be taken for award of marks. In case, the difference of the marks obtained in the two valuations is more than 20% then a third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge valuation shall also be entertained on payment of specified fee.

(b)Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment, record work, internal lab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed in any theory subject/course if he secures not less than 40% in external theory examination and also a minimum of 50% of total marks of that course which assures a minimum of 'E' grade.

A candidate shall be declared to have passed in any practical course if he secures not less than 50% of total marks of that course which assures a minimum of 'E' grade.

Any student appearing for the semester-end practical examination is eligible only if he submits the bonafide record certified by the laboratory class teacher and the HOD.

(C) Thesis Work:

The thesis work shall be carried out in two semesters of one full academic year. The students will be allotted for thesis by the Department committee to various faculty members who act as guides. However, a student can carry-out his thesis work either in the Department or in any other industry / research institute. In any such request to carryout thesis work outside the college, the permission of the Principal and an internal guide is mandatory. Such students should report to the internal guide once in a week essentially through mail or other communication.

The progress report of such work is to be submitted by the guide/external guide every month to the HOD. If the work is not found satisfactory, the HOD has the right to call back the student with the permission of the Principal. In any case the time and conditions for submission of the thesis will be same as for the regular candidates working in the college.

The third semester work is evaluated internally by the committee nominated by the HOD consisting a minimum of four members (concerned in area of specialization) including the HOD. If the work is not satisfactory, the candidate has to improve to the satisfaction of the committee within one month from the end of the semester to carry on his fourth semester work. If he fails to satisfy the committee in the second attempt he has to get readmitted into the third semester as per college norms. The grades will be awarded just as in the case of laboratory work. An internal viva voce by a committee nominated by the HOD is a prerequisite for the submission of the thesis. The fourth semester evaluation will be done through the viva voce examination on the thesis by a board consisting of the following four examiners after submission of the thesis by the candidate duly certified by the Guide and the HOD.

1.The Head of the Department as Chairman

2.Senior Professor in the Department

3.Internal Guide and External Guide (if any)

4.External examiner nominated by the Principal from a panel recommended by the HOD.

The panel of the external subject experts shall be submitted to the Principal by the HOD in mutual consent with the guide and other subject experts of the Department.

The valuation of the thesis shall be as specified in the scheme of examination of the laboratory course.

If the candidate fails in the viva voce examination of the thesis he has to reappear for the viva voce. The candidate has to bear the charges for re-conducting the viva voce.

The prerequisite for submission of the M.Tech. thesis is that one should have published a paper in a reputed international journal/ proceedings of an annual conference.

(d) Supplementary Exam:

There will be **NO** Supplementary examination for M.Tech courses.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses, as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he/she maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be
submitted to the Head of the Department when the candidate reports to the classes immediately after the leave. Certificates submitted afterwards shall not be entertained. Condonation fee as fixed by the college for those who put in attendance between ≥ 66% and <75% shall be charged before the semester-end examinations.

In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments and any such other activities involving the representation of the Institute, with the prior approval of the Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared _Detained'. He/she is not eligible to appear for the semester end examinations. He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es) of students. Such students who are detained and seek readmission, should submit undertaking/declaration that they will abide by the regulations existing at the time of readmission.

X. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. IX.

- A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 50% marks in the sum of the internal evaluation and semester-end examination taken together. In the labs/projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.

- A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement.
- Students, who fail to complete their two year course study within Four academic years from the year of their admission or fail to acquire the credits stipulated for the course shall forfeit their seat in M. Tech course and their admission shall stand cancelled.

XI. Award Of Grades:

The absolute grading system is adopted as follows:

S.No.	Range of Marks {%}	Grade	Description	Grade Points
1	90-100	O	Outstanding	10
2	80-89	A	Excellent	9
3	70-79	B	Very Good	8
4	60-69	C	Good	7
5	55-59	D	Fair	6
6	50-54	E	Satisfactory	5
7	49 and below	F	Fail	0
8	The grade _I' represents absent (subsequently changed into pass or higher grades.)	I	Absent	0

The performance of a student at the end of the each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

$$SGPA = \frac{\Sigma \text{ (Credits of a course x Grade points awarded for a course)}}{\Sigma \text{ (Credits of a course)}}$$

SGPA is calculated for the candidates who have passed in all the courses in that semester.

Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses in all the previous semesters.

XII. Award of Class:

For the award of class, a total of best 74 credits are considered. A candidate, who becomes eligible for the award of M.Tech. Degree, shall be placed in one of the following classes.

S.No.	Class	CGPA
1	First Class with Distinction	7.5 or more*
2	First Class	6.5 or more but less than 7.5
3	Second Class/Pass	5.0 or more but less than 6.5

***First class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.**

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.

XIII. Eligibility for Award of M.Tech. Degree:

A student shall be eligible for the award of the M.Tech degree if he/she fulfils all the following conditions:

1)Registered and successfully completed all the components prescribed for eligibility in the programme of study to which he/she is admitted within the stipulated period,

2)Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),

3)No disciplinary action is pending against him/her and

4)Has no dues to the Institute including hostels.

XIV. Malpractices:

The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid examinations and semester-end examinations to Malpractice Enquiry Committee constituted by the Institute. Such committee shall follow the approved scales of punishment. The Principal shall take necessary final action against the erring students based on the recommendations of the committee.

XV. Amendments to Regulations:

The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVI. General:

(i)Where the words 'he', 'him', 'his', occur in the regulations, they include 'she', 'her', 'hers'.

(ii)The academic regulation should be read as a whole for the purpose of any interpretation.

(iii)In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

COURSE STRUCTURE FOR M TECH (CST)

DEPT. OF COMPUTER SCIENCE & ENGINEERING: ANITS

I Year – I Semester MTech (CST) Computer Science and Technology

Code	Name of the course	Periods per week		Max. marks		Credits
		Lec.	Lab	Sess.	Exams	
MTCST111	Theory of Computation	4	—	40	60	4
MTCST112	Software Project Management	4	—	40	60	4
MTCST113	Advances in DataBase Management Systems	4	—	40	60	4
MTCST114	Elective –I	4	—	40	60	4
MTCST115	Advances in Operating System	4	—	40	60	4
MTCST116	Computer Networks	4	—	40	60	4
MTCST117	Network Programming & Web Programming Lab	—	3	50	50	2
MTCST118	*Online Open Elective (MOOCS)			100		4
MTCST119	Seminar	—	3	100		2
Total		24	6	390	510	32

I Year – II Semester

Code	Name of the course	Periods per week		Max. marks		Credits
		Lec.	Lab	Sess.	Exams	
MTCST121	Machine Learning	4	—	40	60	4
MTCST122	Data ware Housing &Data Mining	4		40	60	4
MTCST123	High Performance Computing with CUDA	4	—	40	60	4
MTCST124	Information Security & Management	4	—	40	60	4
MTCST125	Elective II	4	—	40	60	4
MTCST126	Elective III	4	—	40	60	4
MTCST127	Knowledge Engineering Lab	—	3	50	50	2
MTCST128	*Online Open Elective (MOOCS)				100	4
Total		24	3	290	510	30

List of Elective I:

1. Image Processing
2. Semantic Web
3. Embedded Systems
4. Wireless Sensor & Actuator Networks

List of Elective II:

1. Cloud Computing
2. Mobile Computing
3. Soft Computing
4. Big Data Analysis

List of Elective III:

1. Approximation Algorithms
2. Internet of Things
3. Visual Computing & Applications
4. Software Metrics & Quality Assurance.

***Online Open Elective**	MOOCS{Massive online open courses} in any of the courses offered by Premium institutions such MIT, Stanford etc.,

II Year – I Semester

Code	Name of the course	Periods per week	Exam (Hrs)	Max. marks		Credits
				Sessionals	Exam	
MTCST21	Project Seminar	12	—	100	-	6

II Year – II Semester

Code	Name of the course	Periods per week	Duration of exam (hours)	Max. marks	Max. marks	Credits
				Exam		
MTCST22	Project	12	—	Recommended with grade O,A,B,C,D /Not recommended	200	14

The prerequisite for submission of the M Tech thesis is that one should communicate his/her work to any referred journal or Publication in a conference.

*A student can also opt for MOOCS{Massive online open courses} at any time during the 1 Year M Tech course in any of the courses offered by Premium institutions such MIT, Stanford etc., and have to provide course completion certificate for award of credits.

To award degree, a student has to obtain 74 credits. For a student who has obtained all 82 credits by successfully completing all courses and 4 electives + 2 MOOCS , the best 74 credits will be considered for calculating final CGPA.

MTCST111 **Theory of Computation**

Periods/week 3 **Time: 3 Hours** **Credits: 4**

Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks**

UNIT-I

Finite Automata, Deterministic finite automata, Non deterministic finite automata, finite automata with epsilon transitions. Application of finite automata.

UNIT-II

Regular Expressions, finite automata and regular expressions, algebraic laws of regular expressions, Application of regular expression.

UNIT-III

Context free grammars, The language of a grammar, sentential form, parse trees, ambiguity in grammars and languages, Applications of context free grammar.

UNIT-IV

Normal forms for context free grammer, Chomsky normal form, The pumping lemma for context free languages. Decision properties of context free language.

UNIT-V

Push down automata, Languages of a PDA,. parsing and pushdown automation.
Turing machine, Programming techniques for turing machine, restricted turing machines, turing machine and computers.

Text Books

1. Introduction to automata theory, language & computations- Hopcroft & O.D. Ullman, R. Mothwani. AW, 2001
2. Theory of Computer Science(automata, languages, and computation): K.L.P Mishra and N. Chandrasekaran, PHI,2000
3. Introduction to formal languages & automata- Peter Linz, Narosa Pub. 2001.
4. Fundamentals of the theory of computation- principles and practice by Ramond Greenlaw and H . James Hoover, Harcourt India Pvt. Ltd.1998.
5. Elements of theory of computation by H.R. Lewis & C.H. Papaditriou, PHI,1998.

MTCST112 **SOFTWARE PROJECT MANAGEMENT**

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**

Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks**

UNIT I Software Process Maturity Software maturity Framework**,** Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models
Capability Maturity Model (CMM)**,** CMMI, PCMM, PSP, TSP.

UNIT II Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments. Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV Project Organizations Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT V CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
2. Software Project Management, *Walker Royce,* Pearson Education.
3. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
4. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
5. Process Improvement essentials, James R. Persse, O'Reilly, 2006

MTCST113 ADVANCE DATABASE MANAGEMENT SYSTEM

Instruction: 3 Periods/week Time: 3 Hours Credits: 4

Internal: 40 Marks External: 60 Marks Total: 100 Marks

Unit I Introduction, Parallel database architecture, speedup, scale-up I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation, Design of parallel systems, Implementation issues of Parallel query evaluation, Design of parallel systems, Comparison of Inter-query and Intra-query parallelism.

Unit II Distributed Databases, Study of DDBMS architectures, Comparison of Homogeneous and Heterogeneous Databases, Analysis of Concurrency control in distributed databases, Implementation of Distributed query processing. Distributed data storage, Distributed transactions, Commit protocols, Availability, Distributed query processing, Directory systems-ldap, Distributed data storage and transactions.

Unit III Overview of client server architecture, Databases and web architecture, N-tier architecture, XML, Introduction, Structure of XML Data, XML Document Schema, DTD, Querying and Transformation: XQuery, FLOWR, XPath, XML validation, Web server, API to XML, Storage of XML Data, XML Applications: web services, Web based system, Implementation of XML validations, Use of web servers. XML and DTD implementation, Use of Web service like Amazon web service or Microsoft Azure.

Unit IV Introduction to Decision Support, Data Warehousing, Creating and maintaining a warehouse. Introduction to Data warehouse and OLAP, Multidimensional data model, Data Warehouse architecture, OLAP and data cubes, Operations on cubes, Data preprocessing need for preprocessing, Multidimensional data model, OLAP and data cubes, Data warehousing Concepts, Study of Data preprocessing need for preprocessing, Simulating and maintaining a Warehouse, Analysis of Data preprocessing.Introduction to data mining , Data mining functionalities, clustering - k means algorithm, classification - decision tree, Baysian classifiers, Outlier analysis, association rules - apriori algorithm, Introduction to text mining, Implementing Clustering - k means algorithm, Analysis of Decision tree.

Unit V Information retrieval - overview, Relevance ranking using terms and hyperlinks, synonyms, homonyms, ontologies, Indexing of documents, measuring retrieval effectiveness, web search engines, Information retrieval and structured data. Information Retrieval, Study and Comparison of Synonyms, Homonyms, Ontologies. Implementation issues of Relevance ranking Algorithm.

Text Books:

1. Database System Concepts, Avi Silberschatz , Henry F. Korth , S. Sudarshan McGraw-Hill, Sixth Edition, ISBN 0-07-352332-1.

2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke,McGraw-Hill.

MTCST114 Elective-I IMAGE PROCESSING

Instruction: 3 Periods/week Time: 3 Hours Credits: 4

Internal: 40 Marks External: 60 Marks Total: 100 Marks

UNIT-I

DIGITAL IMAGE FUNDAMENTALS : What Is Digital Image Processing?, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Image Sensing and Acquisition, Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing.

UNIT-II

Intensity Transformations and Spatial Filtering: Background, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

UNIT-III

Filtering in the Frequency Domain: Background, Preliminary Concepts, DFT, Some Properties of the 2-D Discrete Fourier Transform, The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters, Selective Filtering.

UNIT-IV

Morphological Image Processing & Image Compression: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, JPEG Compression model, Huffman coding.

UNIT-V

Image Segmentation: Fundamentals, Point, Line, and Edge Detection, Thresholding, Region-Based Segmentation.

Text Books:

Title: “Digital Image Processing”. Author(s)/Editor(s): R. C. Gonzalez and R. E. Woods. Publisher: Pearson-Prentice-Hall, 2008 ISBN: 0-13-168728-x, 978-0-13-168728-8 Edition: third.

Title: “Digital Image Processing using Matlab”. Author(s)/Editor(s): R. C. Gonzalez, R. E. Woods, S. L. Eddins. Publisher: Pearson-Prentice-Hall, 2004 ISBN: 0-13-008519-7 Edition: 2nd .

MTCST114 Elective-I Semantic Web

Instruction: 3 Periods/week Time: 3 Hours Credits: 4

Internal: 40 Marks External: 60 Marks Total: 100 Marks

UNIT-I

Introduction to Semantic Web and Ontologies: Today's Web, From Today's Web to the Semantic Web, Semantic Web Technologies, A Layered Approach, Differences Among Taxonomies, Thesauri and Ontologies, Classifying Ontologies, Knowledge Representation in Description Logic.

UNIT-II

Describing Web Resources in RDF: XML Essentials like elements/attributes and URIs and Namespaces, RDF (statements and vocabularies, RDF Triples and Graphs) and RDF Schema (Classes, Properties, Individuals).

UNIT-III

Querying the Semantic Web: SPARQL Infrastructure, Basics Matching Patterns, Filters, Organizing result sets, Other forms of SQL Queries, Querying Schemes, Adding Information with SPARQL Update.

UNIT-IV

Web Ontology Language (OWL): Introduction, Requirements for Web Ontology Description Languages, Header Information, Versioning and Annotation Properties, Properties, Classes and Individuals.

UNIT-V

Logic and Inference Rules: Introduction, Example of Monotonic Rules: Family Relationships, Monotonic Rules: Syntax, Monotonic Rules: Semantics, Semantic Web Rule language (SWRL), Rules in SPARQL: SPIN, Non-monotonic Rules: Motivation and Syntax.

Case Studies: Applications: Software Agents, Semantic Desktop, Ontology Applications in Art.

Text Books:

1. Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2008 (Second Edition)
   ISBN: 9780262012423
2. Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2012 (Third Edition)
   ISBN: 9780262018289

Reference Books:

1. Karin K. Breitman and Marco Antonio Casanova, Semantic Web: Concepts, Technologies and
Applications, Springer, 2010, ISBN:9788184893977

MTCST114 Elective-I EMBEDDED SYSTEMS

Instruction: 3 Periods/week Time: 3 Hours Credits: 4

Internal: 40 Marks External: 60 MarksTotal: 100 Marks

Unit -I

A First look at Embedded systems- Examples of Embedded Systems - Telegraph development challenges, **Hardware fundamentals for software engineers**- Logic gates, Advanced Hardware Fundamentals- microprocessor, D-flip flop, memories, Buses, Watch Dog Timer, DMA, UART and PLD's, ASIC, FPGA.

Interrupts basics, ISR; Context saving, shared data problem. Atomic and critical section, Interrupt latency.

Unit -II

Survey of software architectures- Round Robin, Round Robin with Interrupt, Function queue scheduling architecture, Use of real time operating system and their comparison.

Unit-III

RTOS- concept, Tasks and Task structures , Scheduler, Shared data, Reentrancy, Priority Inversion, Mutex binary semaphore and counting semaphore. **Inter task communication methods** and their comparison- message queue, mailboxes and pipes, timer functions, events.

Unit- IV

Interrupt routines in an RTOS environment-Rule1 and Rule2, No Blocking, Solutions to Break the Rules,

Basic Design of Embedded Software using an RTOS- Hard real time and soft real time system principles, Task division, need of interrupt routines, shared data.

Unit -V

Embedded Software Development Tools- Host and target systems, Cross Compilers/Cross Assembler, linkers/locators for embedded systems. Getting embedded software into the target system.

Debugging techniques- Testing on host machine, Instruction set Simulators, logic analyzers. In-circuit Emulators and Software-Only Monitors.

Text Books:

1. David A. Simon, An Embedded Software Primer, Pearson Education, Inc., 1999

2. Sriram V Iyer and Pankaj Gupta, Embedded Real Time Systems programming, TMH,2004

3. Frank Vahid/ Tony Givargis, Embedded Systems Design – A Unified Hardware/Software Introduction, John Wiley & Sons, Inc., 2002

4. Raj Kamal, Embedded Systems, Architecture, Programming and Design, TMH, 2003

MTCST114 Elective-I WIRELESS SENSOR & ACTUATOR NETWORKS

Instruction: 3 Periods/week Time: 3 Hours Credits: 4

Internal: 40 Marks External: 60 Marks Total: 100 Marks

UNIT-I

Overview of Wireless sensor and actuator networks, comparison of adhoc network, infrastructure network and sensor networks. Introduction to wireless sensor Networks and wireless sensor actuator networks, Terminology WSN architecture, requirements and standards, Topologies uses in Wireless sensor and actuator network.

UNIT-II

Applications of wireless sensor networks and wireless sensor actuator networks, , what the challenges ,issues in wireless sensor actuator networks ?requirement for wireless sensor network deployment various standards for WSAN Development of sensor network. Overview of broadcasting techniques, backbone and broadcasting in sensor actuator networks, coverage and connectivity criteria.

UNIT-III

Placement and deployment of sensors in wireless sensor networks. Static sensors and mobile sensors placements.

Placement by Actuators: - **Least Recently Visited Approach, Snake like Deployment Approach, Back-Tracking-Deployment Approach**

Different methods used for sensor placement and deployment, Issues with the Wireless sensor network deployment

Sensor Self Depolyment Methods :- Virtual Force/Vector Based Approach, Voronoi Based Approach, Mobile Sensor Migration

UNIT-IV

Multicasting,multiratingcasting,geocasting and anycasting in sensor network,

Routing in Wireless Sensor and Actuator Networks : flooding,gossiping,classification of routing protocols, Study of types of routing protocols used in wireless sensor network.

Routing protocols based on network strucutures :- Flat networks routing – directed diffusion,SPIN,Rumor,GBR hierarchicial networks routing :- LEACH,PEGASIS,TEEN routing,location based routing :- Greedy,Face,Geographic adaptive fidelity, Geographic and energy aware routing.

UNIT-V

Sink Mobility :- Data gathering in deplay tolerant Wireless Sensor Networks : - Sink tour and RP based data collection methods : Direct contact data collection,Rendezvous based data collection,Introduction to sink mobility, energy problems, **Topology Control in Sensor, Actuator : - use of MST and LMST** , Introduction and detection of critical nodes and links : how to identify the critical nodes and links,how to solve the problem of critical nodes and critical links.

Text Books:

1.Wireless Sensor and Actuator Networks Algorithms and Protocols for Scalable Coordination and Data Communication, Edited by Amiya Nayak and Ivan Stojmenovic A JOHN WILEY & SONS, INC., PUBLICATION,2010.

2. Wireless Communications & Networks, 2nd Edition, William Stallings ,Pearson Education India,2009

3. Wireless Sensor Networks: An Information Processing Approach,Feng Zhao and Leonidas Guibas ,Morgan Kauffman Publication,2004

MTCST115 **Advance Operating System**
Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**

Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks**

UNIT-I Process Synchronization: Functions of an operating system, Design approaches, why advanced operating system, Types of advanced operating systems, synchronization mechanisms- concept of a process, concurrent processes, the critical-section problem, other synchronization problems, language mechanisms for synchronization.**Process Deadlocks:** Preliminaries, models of deadlock, models of resources, graph-theoretical model of a system state, necessity conditions for a deadlock, system with single-unit resources and reusable resources.

UNIT-II Distributed Operating Systems: Architecture of a Distributed Systems, system architecture types, issues in distributed operating systems, communication networks, and communication primitives. Limitations of distributed systems, Lamport's logical clocks, vector clocks, casual ordering of messages, global state.**Distributed Mutual Exclusion:** Introduction, preliminaries, Lamport's Algorithm, Ricart-Agrawala Algorithm, generalized non-token based algorithm, token-based algorithm, Suzuki-kasami broadcast algorithm.

UNIT-III Distributed Deadlock Detection: Introduction, preliminaries, deadlock handling strategies, distributed deadlock detection, centralized-deadlock detection algorithms, distributed deadlock detection algorithms, hierarchical deadlock detection algorithms, Agreement protocols-classification-solutions-Applications.

UNIT-IV Distributed Resource Management: Distributed file systems, mechanisms, design issues, distributed shared memory architecture-algorithms-memory coherence, coherence protocols, design issues. Distributed scheduling-issues, components, load distribution, performance comparision.

UNIT-V Failure Recovery and Fault Tolerance: Recovery-concepts, classifications, error recovery, basic approaches, recovery in concurrent systems, Synchronous and Asynchronous Check pointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Nonblocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols.

Text Book:

Advanced Concepts in Operating Systems by Mukesh Singhal and N.G. shivaratri, McGraw Hill, 2000.
Operating System concepts by Abraham Silberschatz, Peter B. Galvin, G. Gagne, sixth edition, Addision Wesley Publishing co., 2003.
Modern Operating Systems by Andrew S. Tanenbaum, Second Edition, Addision Wesley, 2001.

MTCST116 **Computer Networks**

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**

Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks**

UNIT- I:

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, TCP / IP protocol suite, Guided and Unguided Transmission media, Understanding of Delay, Loss and Throughput in the packet switching network.

UNIT- II:

Introduction and link layer services, error-detection and correction techniques, Multiple access protocols, Sliding Window Protocols, Multiplexing, Switching, Broad Band ISDN , ATM Networks.

UNIT- III:

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT -IV:

TRANSPORT Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

UNIT-V:

Domain Name System (DNS) , E-mail, FTP,TFTP,WWW ,HTTP,– Multimedia Network Security: Cryptography – Symmetric key and Public Key algorithms - Digital signature –Management of Public keysAdvanced Concepts in Networks: Over View of Cellular Networks, Adhoc Networks, Mobile Adhoc Networks, Sensor Networks, Virtual Private Networks .Delay Tolerant Networks DTN, .

Text Book:

1. Computer Networks, Andrews S Tanenbaum,, Edition 5, PHI, ISBN:-81-203-1165-5
2.Computer Networking Top Down approach 3rd edition By Jim kurose and keith ross
3.Computer networks, Mayank Dave, CENGAGE.
4. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier.
5.Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

MTCST117 **Network Programming and Web Programming Lab**

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 2**

Internal: 50 Marks **External: 50 Marks** **Total: 100 Marks**

Part I:

Network programming

1.Identifying well known ports on a Remote System :By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.

2. Writing a Chat application :

i). One-One: By opening socket connection and displaying what is written by one party to the other.

ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.

3. SMTP Client : Gives the server name, send e-mail to the recipient using SMTP commands.

4.TFTP- Client:To develop a TFTP client for file transfer.

5. HTTP-Server: Develop a HTTP server to implement the following commands. GET, POST, HEAD, DELETE. The server must handle multiple clients.

Part II:

Web Programming

1.Design of the Web pages using various features of HTML and DHTML

2. Design of the Web pages using client side scripting (javascript) for page validation.

3.Client server programming using servlets and JSP on the server side and java script on the client side.

4. Multimedia effects on web pages design using Flash

References

1. Java Network Programming, Harol, Orielly Publications

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Subject code: MTCST119 **SEMINAR** **Practical Time: 3 Hours**

Credits:2 **Total: 100 Marks**

Purpose: To enable a student to be familiar with Communication skills and to make them learn about technical writing skills. Student is expected to Learn

a. How to Make a Presentation

I. Verbal

II.Non Verbal

III. LCD based Power Point

b. How to write a report

I. Abstract

II. Body

III. Conclusions

IV. Executive Summary

c. Communication

Students will be Given a Topic of Importance and are expected to Present the Topic Verbally in 45minutes + Question Answering

To Present the Topic as a Report

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ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

M. Tech I/II CST SEMESTER -II

Syllabus

Subject code: MTCST121	**Machine Learning**	
Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

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.

UNIT II: 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 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, Gibbs algorithm, Naïve bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

UNIT IV: Computational learning theory : Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces.**Instance-Based Learning**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

UNIT V: Learning set of Rules: Introduction, Sequential Covering Algorithms, Learning and Learning Set of First Order Rules.Machine Learning and its Application, case studies such as classification, clustering, prediction .

TEXT BOOK:

1. Machine Learning ,Tom M. Mitchell, MGH,1997

REFERENCE BOOK:

1. Machine Learning, An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)
2. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)
M. Tech I/II CST SEMESTER -II

Syllabus

Subject code: MTCST122 Data Ware Housing & Data Mining

Instruction: 3 Periods/week Time: 3 Hours Credits: 4
Internal: 40 Marks External: 60 Marks Total: 100 Marks

UNIT – I

Introduction to Data Mining: Evolution of I T into DBMS, Motivation and importance of Data Warehousing and Data Mining,Kinds of Patterns, Technologies, Basic Data Analytics: Data Objects and Attributes Types, Statistical Descriptions of Data, Data Visualization, Estimating Data Similarity and Dissimilarity, Major Issues in Data Mining., Data Mining Applications

Data Warehouse and OLAP Technology: Basic Concepts of Data warehouse, Data Modeling using Cubes and OLAP, DWH Design and usage, Implementation using Data Cubes and OLAPs, Data Generalization with AOI.

UNIT – II

Data Mining Primitives & Data Cubes: DataMining Primitives, Data Mining Tasks, Data Mining Query Language, DesigningGraphical user Interfaces based on aData Mining Query language, Preliminary Concepts of Data Cube Computation, Data Cube Computation Methods: Multi-way Array Aggregation for Full Cube, BUC Computing for Iceberg Cubes, Star-Cubing Using Dynamic Star-Tree Structure, Pre-computing Shell Fragments for Fast High-Dimensional OLAPs.

Data Mining Concept Description:: Data Preprocessing: Pre-processing the Data, Data Cleaning, Data Integration, Data Reduction, Data Transformation, Discretization and Concept Hierarchy Generation; **Data** Architectures of Data Mining Systems; Characterization and Comparison, Concept Description, Data Generalization and Summarization; Analytical Characterization: Analysisof AttributeRelevance, Mining Class Comparisons, Discriminating between Different Classes, Mining Descriptive & Statistical Measures in Large Databases.

UNIT – III

Mining Frequent Patterns Based on Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori Algorithm, Association Rule Generation, Improvements to A Priori, FP-Growth Approach, Mining Frequent Patterns using Vertical Data Formats, Mining Closed and Max Patterns, Pattern Evaluation Methods

UNIT – IV

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy Advanced Methods: Classification by Back Propagation, SVM, Associative Classification, Lazy Learning, Fuzzy Sets, Rough Sets, Genetic Algorithms, Multiclass Classification, Semi-Supervised Classification

UNIT – V

Cluster Analysis: Basic Concepts, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical

Methods, Density Based Methods, Grid Based Methods, Evaluation of Clustering Solutions.

Text Book:

1. Data Mining- Concepts and Techniques by Jiawei Han, MichelineKamber and Jian Pei –Morgan Kaufmann publishers –--3rd edition
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K.Pujari, University Press Data mining concepts by Tan, Steinbech, and Vipin Kumar - Pearson Edu publishers
4. Data Mining –Introductory and Advanced by Margarett Dunham -- Pearson Education publishers
5. Data Warehousing for Real –world by Sam Annahory-- Pearson Education publishers
6. Web Data Mining and Applications in Business Intelligence and Counter Terrorism, BavaniThuraisingham, CRC Press, June 2003

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
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M. Tech I/II CST SEMESTER

Syllabus

MTCST123 HIGH PERFORMANCE COMPUTING WITH CUDA

Instruction: 3 Periods/week Time: 3 Hours Credits: 4
Internal: 40 Marks External: 60 Marks Total: 100 Marks

UNIT 1 INTRODUCTION: GPUs as Parallel Computers, Architecture of a Modern GPU, Why More Speed or Parallelism? Parallel Programming Languages and Models .

(Text Book 1)

UNIT 2 HISTORY OF GPU COMPUTING : Evolution of Graphics Pipelines ,The Era of Fixed-Function Graphics Pipelines, Evolution of Programmable Real-Time Graphics, Unified Graphics and Computing Processors , GPGPU: An Intermediate Step, GPU Computing , Scalable GPUs, Recent Developments, Future Trends.

(Text Book 1)

UNIT 3 INTRODUCTION TO CUDA: Data Parallelism, CUDA Program Structure A Matrix–Matrix Multiplication Example, Device Memories and Data Transfer, Kernel Functions and Threading. CUDA Thread Organization Using blockIdx and threadIdx, Synchronization and Transparent Scalability , Thread Assignment, Thread Scheduling and Latency Tolerance

(Text Book 1)

UNIT 4 CUDA MEMORIES & PERFORMANCE CONSIDERATIONS:
Importance of Memory Access Efficiency, CUDA Device Memory Types , A Strategy for Reducing Global Memory Traffic, Memory as a Limiting Factor to Parallelism, More on Thread Execution ,Global Memory Bandwidth ,Dynamic Partitioning of SM Resources , Data Pre fetching Instruction Mix , Thread Granularity , Measured Performance

(Text Book 1)

UNIT 5 PARALLEL PROGRAMMING& COMPUTATIONAL THINKING :
Goals of Parallel Programming , Problem Decomposition, Algorithm Selection ,Computational Thinking, **CASE STUDIES**: High Performance Linear ,Algebra**, Design of parallel algorithms :**Odd-Even Transposition sort, quick sort ,bitonic sort ,Graph Analytics, N-body problems, **GPU-Super Computer Acceleration of Pattern Matching.**

(Text Books 1,2,3)

TEXT BOOKS:

1) Programming Massively Parallel Processors A hands-on Approach By David B. Kirk and Wen-mei W. Hwu, Morgan Kaufmann, 2010.
2) Introduction to High Performance Scientific Computing, Victor Eijkhout, Edmond Chow, Robert van de Geijn ,2nd edition 2014.
3)GPU Computing Gems, **Wen-mei W. Hwu,** Emerald Edition , Morgan Kaufmann Publishers 2011,

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Subject code: MTCST124

Information Security and Management Systems

Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

UNIT I Threat analysis: Basic security terminologies, Understanding the threat environment, security goals, compromises, countermeasures, Need for security, Threats, Attacks, Types of Attacks, Employee and ex-employee threats- why employees are dangerous, employee sabotage, employee hacking, employee financial theft and theft of intellectual property, employee computer and internet abuse, data lose, other internal attacks; Malware and malware writers; virus; Trojan horses and rootkits.
(Text Book-1)

UNIT II Risk management: Risk, Types of Risks **,**Risk analysis- reasonable risk, Classic risk calculations, problem with classic risk analysis, responding to risk; Risk Management: Overview of Risk Management, Risk Identification- Business Risks, Risk Management Models, Risk Assessment, Risk Control Strategies, Quantitative and Qualitative Risk Management Approaches
(Text Book-5)

UNIT III Security Technologies: Firewalls– Processing modes, Categorization, Architectures, Selection and management of the firewalls. Intrusion Detection and Prevention Systems (IDS & IPS), Protecting Remote Connections – Virtual Private Networks for security, Physical Security

(Text Book-3)

UNIT IV Information Security Standards: Information Security Policy, Standards, and Practices, Policy Management, Information Security Blue print, ISO/IEC 27001:2005, Design of Security Architecture, Security Education, Training, and Awareness Program,

(Reference -5)

UNIT V **Implementation of Information Security**: Information Systems Security Certification and Accreditation. Cryptography techniques –asymmetric and symmetric key cryptosystems introduction. Information Security Maintenance: Maintenance models, Digital Forensics. Overview of ISO 17799/ISO 27001 Standards.

(Reference -6)

TEXT BOOKS:

1. Corporate Computer Security, 4th Edition, by Randall J. Boyle (Author), Raymond R. Panko (Author)
2. Principles of Information Security. Michael E. Whitman, Herbert J. Mattord, Cengage Learning, 4th edition.
3. **The Essentials of Risk Management** by Michel Crouhy and Dan Galai Robert Mark(Professional Finance and Investment) Second Edition
4. Information Systems Security, Nina Godbole, Wiley Publishers, India, 2009
5. Corey Schou and Dan Shoemaker, Information assurance for the enterprise: a roadmap to information security, TMH, 2007

REFERENCES:

1. Slay, J. and Koronios, A. (2006) IT Security and Risk Management, Wiley
2. Information Security Policies, Procedures, and Standards: Guidelines for Effective Information Security Management (Paperback) AUERBACH; 1 edition
3. Microsoft Security Risk Management Guide
4. Risk Management Guide for Information Technology Systems http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf
5. Guide lines for Patch and Vulnerability Management Programme http://csrc.nist.gov/publications/nistpubs/800-40-Ver2/SP800-40v2.pdf
6. Incident Response and Computer Forensics. Chris Prosise and Kevin Mandia. McGraw- Hill (2003).

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective-II

Subject code: MTCST125	**Cloud Computing**	
Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

UNIT-I

Introduction to cloud computing - distributed computing, centralized computing, grid computing, cluster computing, what is intranet and internet.
What's cloud computing, History of cloud computing, , Benefits of cloud computing, Service models, Deployment models. Current issues and challenges of cloud computing
Cloud Computing Basics - Cloud Computing Overview, Six Phases of Computing Paradigms, cloud Computing architecture, Applications

UNIT-II

Hardware and Infrastructure– Clients:-Mobile,Thick,Thin, **Security**:- Data Leakage, Offloading work,Logging,Forensics, Compliance VPNs,Key management **,Network**- four different levels : Basic Public Internet, The Accelerated Internet, Optimized Internet Overlay Site-to-Site VPN, **Services** : - identify,integration,mapping,payment,search. **Accessing the Cloud** - Platforms, Web Applications, Web APIs,Web Browsers.

UNIT-III

Cloud Services : - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS),Software plus services - Overview, Cloud computing applications and business case for going to the cloud, **Infrastructure as a Service**--Amazon EC2, **Platform as a Service**—RightScale, Salesforce.com ,**Software as a Service**--Google App Engine and Salesforce , --Microsoft's take on SaaS is slightly different with their Software plus Services (sometimes they shorten it to S+S) Software plus Services **,** how applications help business –operational benefits and economical benefits.

UNIT-IV

Cloud Storage and data storage security: - what is cloud storage? uses of cloud storage, Types of

cloud storage, things looked for cloud storage, infrastructure, data types used in cloud computing, Data security challenges, VPN- Virtual Private Network ,FADE – File assured deletion ,TPA – Third Party Auditing. Cloud Security – need for security and privacy in cloud computing, Security and privacy issues,

UNIT-V

Local Clouds,Thin Clients,Thick clients – Types of Virtualizations,Virtualization in Your Organization, Server Solutions, Thin Clients,

Migrating to the Cloud - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration, Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

The Basics of Cloud Computing , Derrick Rountree and lleana Castrillo

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective-II

Subject code: MTCST125	**Mobile Computing**	
Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

UNIT-I

Introduction: Wireless transmission, Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread Spectrum, MAC SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

UNIT-II

Telecommunication Systems: GSM, GPRS, Capacity Allocation: FAMA and DAMA, Broadcast Systems: Digital audio broadcasting (DAB), Digital video broadcasting (DVB), CDMA and 3G.

UNIT-III

Wireless LAN: IEEE 802.11, Architecture, Services, MAC-Physical Layer, IEEE 802.11a- 802.11b Standards, Bluetooth.

UNIT-IV

Routing Adhoc Network Routing Protocols: Adhoc Network Routing Protocols, Destination Sequenced Distance Vector Algorithm, Cluster Based Gateway Switch Routing, fish-eye state routing, Dynamic Source Routing, Adhoc on-demand Routing, Location Aided Routing, Zonal Routing Algorithm.
Mobile IP, Dynamic Host Configuration Protocol, Traditional TCP-Classical TCP Improvements-WAP, WAP 2.0

UNIT-V

Publishing & Accessing Data in Air: Pull and Push Based Data Delivery models, Data Dissemination by Broadcast, Broadcast Disks, Directory Service in Air, Energy Efficient Indexing Scheme for Push Based Data Delivery.
Mobile Transaction and Commerce: Models for Mobile transaction, Kangaroo and Joey Transactions, Team Transaction. Recovery Model for Mobile Transactions. Electronic Payment and Protocols for Mobile Commerce.

Text Books:

1. Jochen, M Schiller, “Mobile Communications, 2nd Edition Pearson Education, India, 2009.
2. Kurnkum Garg “Mobile Computing”,Pearson 2010
3. Asoke K Talukder,Roopa R Yavagal, “Mobile Computing”, TMH 2008

4. Raj Kamal,"Mobile Computing", Oxford, 2009.

Reference Books:

1. William Stallings, Wireless Communications & Networks, 2nd Edition, Pearson
2. Mike Gallegher, Randy Snyder, "Mobile Telecommunications Networking with IS-41", McGraw Hill 1997.
3. Yi-Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architecture, Wiley
4. Vijay Kumar, Mobile Database Systems, Wiley

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Elective – II

Syllabus

Subject code: MTCST125 **Soft Computing**

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks: 100**

UNIT-I

FUNDAMENTALS OF NEURAL NETWORKS: Basic concepts of Neural Network, Human Brain, Model of an Artificial Neuron, Neural Network Architectures, Characteristics of Neural Networks, Learning Methods, Taxonomy of Neural Networks Architectures, History Of Neural Networks, Early Neural Network Architectures and Applications

UNIT-II

BACKPROPAGATION NETWORKS: Architecture of a Back Propagation Network, Back Propagation Learning, Effective of Tuning Parameters of the Back Propagation Neural Network, selection of Various Parameters of BPN, Research Directions, Applications.

UNIT-III

ADAPTIVE RESONANCE THEORY: Introduction, ART1: Architecture, Special Features, Algorithm, Illustration, ART2: Architecture, Algorithm, Illustration, Applications

UNIT IV

FUZZY SET THEORY: Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations

FUZZY SYSTEMS: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule based System, Defuzzification Methods, and Applications

UNIT V

FUNDAMENTALS OF GENETIC ALGORITHMS: History, Basic Concepts, Creation of Offspring, Working Principle, Encoding, Fitness Function, Reproduction

GENETIC MODELLING: Inheritance Operators, Cross Over, Inversion and Deletion, Mutation Operator, Bit-Wise Operators and used in GA, Generational Cycle, Convergence of Genetic Algorithm, Applications, Multi-Level Optimization, Difference and Similarities between GA and Other Traditional Methods, Advances in GA.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.**(Refer PART-I AND PART-II in this Book)**

REFERENCE BOOKS:

1. Neural Networks: A Comprehensive Foundation by Simon Haykin- PHI Publication.
2. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
5. Fuzzy Logic¨Intelligence, Control and Information by John Yen and Reza Langari- Pearson Publication.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective-II

Subject code: MTCST125	**Big Data Analysis**	
Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

UNIT I - Introduction to Big Data: Big Data and its Importance - Four V's of Big Data - Drivers for Big Data - Introduction to Big Data Analytics - Big Data Analytics applications.

UNIT II - R and Hadoop: Features of R language, Hadoop features, HDFS and MapReduce Architecture. **Hadoop MapReduce Programs:** Basics of MapReduce, Hadoop MapReduce Scenario, limitations of MapReduce, MapReduce objects, Hadoop MapReduce example.

UNIT III - Integrating R and Hadoop: Introducing RHIPE, architecture of RHIPE, RHIPE samples, Understanding the RHIPE function reference, RHadoop.

UNIT IV - Hadoop Streaming with R: run Hadoop streaming with R, Exploring the Hadoop Streaming R package. **Data Analytics with R and Hadoop:** the data analytics project life cycle, data analytics problems, computing the frequency of stock market change, case study.

UNIT V - Big Data Analysis with Machine Learning: Introduction to machine learning, Supervised and unsupervised machine learning Algorithms. **Importing and Exporting Data from Various DBs:** data files as database, MySQL, Excel, MongoDB, SQLite, PostgreSQL, Hive, Hbase.

REFERENCES:

1. Vignesh Prajapati ,“Big Data Analytics with R and Hadoop”, 2013 Packt Publishing.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", IBM Corporation, 2012.
3. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", Wiley CIO Series, 2013.
4. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'Reilly, 2012.
5. Kevin Roebuck, "Storing and Managing Big Data - NoSql, Hadoop and more: High-Impact Strategies - What You Need to Know", Tebbo, 2011.
6. Bill Franks, "Taming The Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective-III

Subject code: MTCST126 **Approximation Algorithms**

Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

Syllabus

Unit 1: The Greedy Algorithm, Layering, Application to shortest superstring, Metric Steiner Tree, MST Based algorithm, Metric TSP, A simple factor 2 algorithm, Improving the factor to 3/2. Example problems. (Chapters 2 and 3)

Unit 2: The mutliway cut problem, Minimum K-cut problem. Parametric pruning applied to metric K-center, the weighted version, Cyclomatic weighed graphs, layering applied to feedback vertex set. Example problems.
(Chapters 4, 5 and 6)

Unit 3: An FPTAS for Knapsack, Strong NP-hardness and existence of FPTASs. Bin Packing, An asymptotic PTAS. Application: Constrained Shortest Paths, Directed Steiner Trees or Geometric PTASs (polynomial time approximation schemes). Example problems.
(Chapters 8 and 9)

Unit 4: Factor 2 algorithm, A PTAS for minimum makespan, Bin packing with fixed number of object sizes, Reducing makespan to restricted bin packing. Euclidean TSP The algorithm, Proof of correctness, LP duality theorem, Min-Max relations and LP duality. Two fundamental algorithm design techniques, A comparison of the technique and the notion of integrality gap. Example problems.
(Chapters 10, 11 and 12)

Unit 5: Set Cover via dual fitting: Dual fitting based analysis for the greedy set cover algorithm, generalization of set cover, dual fitting applied to constrained set multicover. Rounding applied to set cover: A simple rounding algorithm, Randomized rounding, half integrality of vertex cover. Example problems.
(Chapters 13 and 14)

Text Book: "Approximation Algorithms" by Vijay V Vazirani.
Online version at: http://www.cc.gatech.edu/fac/Vijay.Vazirani/book.pdf
Refereed Chapters from this book is an indicative only.

References:

1. The Design of Approximation Algorithms by David Williamson and David Shmoys
2. Geometric Approximation Algorithms by Sariel Har-Peled, First Edition, 2011.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
I/II M. Tech(CST) SEMESTER-II

MTCST126	**INTERNET OF THINGS (Elective-III)**
Instruction: 3 Periods/week	**Time: 3 Hours Credits: 4**
Internal: 40 Marks	**External: 60 Marks Total: 100 Marks**

UNIT- I : Introduction to the Internet of Things

Introduction, WWW, Internet, Network Protocols, History of IoT , About objects/things in the IoT , The identifier in the IoT , Enabling technologies of IoT , About the Internet in IoT

UNIT-II : Radio Frequency Identification Technology , Applications and Related Research Issues

Introduction , Principle of RFID , Components of an RFID system , Issues , Introduction , Concepts and terminology , RFID applications , Ongoing research projects ,

UNIT – III : Wireless Sensor Networks: Technology

History and context , The node, Connecting nodes , Networking nodes , Securing communication , Standards and Fora ,

UNIT – IV Power Line Communication Technology

Introduction , Overview of existing PLC technologies and standards , Architectures for home network applications , Internet of things using PLC technology.

UNIT – V : RFID Deployment for Location and Mobility Management on the Internet

Introduction , Background and related work , Localization and handover management relying on RFID , Technology considerations , Performance evaluation

IOT – Setting the standards Introduction Standardizing the IoT , Exploiting the potential of RFID, Identification in the IoT , Promoting ubiquitous networking: any where, any when, any what , Safeguarding data and consumer privacy

REFERENCES: The Internet of Things: Connecting Objects ,Hakima Chaouchi (Editor), ISBN: 978-1-84821-140-7 , 288 pages, June 2010, Wiley-ISTE

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective-III

Subject code: MTCST126 **Visual Computing &Applications**

Instruction: 3 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 40 Marks	**External: 60 Marks**	**Total: 100 Marks**

UNIT-I

Review of graphics systems – Video display devices, Graphics Software; **Output primitives** – Point and line drawing algorithms, Loading the frame buffer, Circle and ellipse generating algorithms; Pixel addressing and object geometry, Filled area primitives, **2D and 3D geometric transformations** – Matrix representations and homogeneous coordinates, Scaling, Translation, Rotation, special type, **Clipping operations** – Line and polygon clipping algorithms.

UNIT-II

Representation of Geometry - Parametric Curves, Bezier Curves, B-Splines (degree zero and higher degrees), NURBS, **Tensor Product Surfaces, Triangle Meshes, Subdivision Methods-** Discrete convolution, Lane-Riesenfeld algorithm, Linear (Gaussian) Diffusion.

UNIT-III

Digital Image Processing- Digital Image Filtering, Image Enhancement and Restoration, Wiener Filters, Nonlinear Image processing (Median filtering), Image Segmentation, **Image Transforms and applications**- DFT, DCT, KLT, applications, Orthogonal filter bank (Haar basis), DWT, Scale Space, Vector quantization, Gray level and color quantization, **Template matching-**Template matching and case study, Optical Flow.

UNIT-IV

Learning Methods in Vision- Features, Feature extraction and feature selection (SIFT-a case study), **Classifier Learning-** SVM, RBF network, **Dimensionality Reduction**- PCA, LDA
Modeling- Markov Random Fields, HMM, Maximum Entropy Inference and Bayesian Image Analysis.

UNIT-V

Case studies- Basic approaches for Face recognition, Optical character recognition, and Object detection in videos.

Text Books:

1. Computer Graphics, D. Hearn and M.P. Baker (C Version), Pearson Education.
2. Digital Image Processing, 3/e by Gonzalez, Pearson (2009).

Web Resources:

1. https://graphics.stanford.edu/courses/cs348a-01-winter/Papers/warren-subdivision.pdf
2. http://www.cs.utexas.edu/~grauman/courses/spring2011/

Reference Books:

1. Computer Graphics: a Programming Approach by Steven Harrington, McGraw-Hill.
2. FUNDAMENTALS OF DIGITAL IMAGE PROCESSING (English) 2nd Edition, Anil K. Jain, Phi Learning
3. Computer Vision: Algorithms and Applications, by R. Szeliski, Springer

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
M. Tech I/II CST SEMESTER

Syllabus

Elective - III

Subject code: MTCST126 **Software Metrics & Quality Assurance**

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 40 Marks **External: 60 Marks** **Total: 100 Marks**

UNIT-I

What Is Software Quality: Quality: Popular Views, Quality Professional Views, Software Quality, Total Quality Management and Summary. **Fundamentals Of Measurement Theory:** Definition, Operational Definition, And Measurement, Level Of Measurement, Some Basic Measures, Reliability And Validity, Measurement Errors, Be Careful With Correlation, Criteria For Causality, Summary. **Software Quality Metrics Overview:** Product Quality Metrics, In Process Quality Metrics, Metrics for Software Maintenance, Examples For Metrics Programs, Collecting Software Engineering Data. **10 hours**

UNIT-II

Applying The Seven Basic Quality Tools In Software Development : Ishikawa's Seven Basic Tools, Checklist, Pareo Diagram, Histogram, Run Charts , Scatter Diagram, Control Chart, Cause And Effect Diagram. **The Rayleigh Model:**Reliability Models, The Rayleigh Model Basic Assumptions, Implementation, Reliability And Predictive Validity.
10 hours

UNIT-III

Complexity Metrics And Models: Lines Of Code, Halstead's Software Science , Cyclomatic Complexity Syntactic Metrics, An Example Of UNIT Design Metrics In Practice .**Metric And Lessons Learned For Object Oriented Projects:** Object Oriented Concepts And Constructs, Design And Complexity Metrics, Productivity Metrics, Quality And Quality Management Metrics, Lessons Learned For object oriented Projects.
10 hours

UNIT-IV

Availability Metrics: Definition And Measurement Of System Availability, Reliability Availability And Defect Rate, Collecting Customer Outage Data For Quality Improvement, In Process Metrics For Outage And Availability
Conducting Software Project Assessment : Audit Ad Assessment , Software Process Maturity Assessment And Software Project Assessment , Software Process Assessment A Proponed Software Project Assessment Method.
10 hours

UNIT-V

Dos And Don'ts Of Software Process Improvement : Measuring Process Maturity, Measuring Process Capability, Staged Versus Continuous Debating Religion, Measuring Levels Is Not Enough, Establishing The Alignment Principle , Take Time Getting Faster, Keep it Simple Or Face Decomplexification, Measuring The Value Of Process Improvement , Measuring Process Compliance , Celebrate The Journey Not Just The Destination. **Using Function Point Metrics to Measure Software Process Improvement: Software** Process Improvement Sequences, Process Improvement Economies, Measuring Process Improvement at Activity Levels.**10 hours**

Text Book

1.Stephen H Khan: Metrics and Models in Software Quality Engineering, Pearson 2nd edition 2013.

REFERENCES:

1.Norman E-Fentor and Share Lawrence Pflieger." So ftware Metrics". International Thomson Computer Pre ss, 1997.
2.S.A.Kelkar,"Software quality and Testing, PHI Le aring, Pvt, Ltd., New Delhi 2012.
3.Watts S Humphrey, "Managing the Software Process ", Pearson Education Inc, 2008.
4.Mary Beth Chrissis, Mike Konrad and Sandy Shrum, "CMMI", Pearson Education(Singapore) Pte Ltd, 2003
5.Philip B Crosby, " Quality is Free: The Art of Making Quality Certain ", Mass Market, 1992.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
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M. Tech I/II CST SEMESTER

Subject code: MTCST127 **Knowledge Engineering lab** **Practical Time: 3 Hours**
Credits: 2

Internal: 50 Marks **External: 50 Marks** **Total: 100 Marks**

Introduction:

The rapid growth of the Web has generated a wealth of information for individuals and organizations, to the extreme of overloading its users with information. This phenomenon has created the pressing need for turning this information into actionable knowledge according to the requirements of each individual. This need represents the major motivation behind the R&D activities of Knowledge Engineering Laboratory (KEL). KEL researchers can combine their efforts to develop knowledge technologies that will enable the efficient, cost-effective and user-adaptive management and presentation of information.The objectives are as follows

Course Objective:

1. Practical exposure on implementation of well known data mining tasks.
2. Exposure to real life data sets for analysis and prediction.
3. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
4. Handling a small data mining project for a given practical domain.
5. To introduce students to the basic concepts and techniques of Machine Learning.
6. To develop skills of using recent machine learning software for solving practical problems.
7. To gain experience of doing independent study and research

Learning Outcomes:

1. The data mining process and important issues around data cleaning, pre-processing and integration.
2. The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
3. basic knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence
4. a practical knowledge of machine learning algorithms and methods

List of Programs [All the programs have to implemented in JAVA or R language]

1. Develop an application to implement defining subject area, design of fact dimension table, data mart.

2. Develop an application to implement OLAP roll up, drill down, slice and dice operation

3. Develop an application to construct a multidimensional data.

4. Develop an application to implement data generalization and summarization technique.

5. Develop an application to extract association rule of data mining.

6. Develop an application for classification of data using Decision Tree

7. Develop an application for implementing clustering using any one technique

8. Develop an application for implementing Naïve Bayes classifier

9. Develop an application for implementing KNN

10. Study on various tools used in Data mining and Machine Learning. (ex : WEKA, SCIKIT LEARN)