Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

ACADEMIC REGULATIONS

CURRICULUM STRUCTURE

and

DETAILED SYLLABUS

for

Two Year PG Programme

in

M. Tech. (Information Technology)

(Applicable for batches admitted from 2019)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

VISION OF THE INSTITUTE

To be a premier institute of excellence developing highly talented holistic human capital that contributes to the nation through leadership in technology and innovation through engineering education.

MISSION OF THE INSTITUTE

1. To impart Personnel Skills and Ethical Values for Sustainable Development of the Nation.
2. To create Research & Industry oriented centers of excellence in all engineering disciplines.
3. To be a renowned IPR generator and repository for innovative technologies.
4. To develop Research and Industry oriented technical talent.
5. To benchmark globally the academic & research output.

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

VISION OF THE DEPARTMENT

Department of Computer Science and Engineering strives rigorously to impart intellectual environment with global standards that fosters the search for new knowledge in a highly dynamic computing-centric society through research & applied efforts.

MISSION OF THE DEPARTMENT

- To provide quality education in both theoretical and applied foundations of computer science and train the students to solve the real world problems effectively thus enhancing their potential for high quality careers.
- To facilitate the students and faculty to inculcate the research culture to advance the state art of computer science and integrate research innovations in multi-disciplinary fields.
- To equip student / faculty with excellent teaching learning capabilities through advanced learning tools and technologies.
- To produce students with critical thinking and lifelong learning capabilities to apply their knowledge to uplift the living standards of the society.
- To produce students with enriched skill set, professional behaviour, strong ethical values and leadership capabilities so as to work with commitment for the progress of the nation.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEO'S):

PEO1	To produce IT professionals with in depth knowledge in software design, programming and analytical skills to cater the challenging industrial and societal needs in an effective manner with ethics and human values.
PEO2	Design and implement web enabled solutions for Information Technology To produce Sustained learner to bring out creative and innovative ideas by addressing the research issues/ to_serve as faculty for IT education.
PEO3	Develop higher order research skills and innovative ideas to solve To produce entrepreneurs in IT with good interpersonal and managerial skills to survive in multidisciplinary fields.

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PROGRAMME OUTCOMES

At the end of the programme, the student shall be able to:

PO1 The student shall possess fundamental and advanced knowledge of core discipline such as networking and security, programming and computing and other IT applications.

PO2 Design and implement web enabled solutions for Information Technology problems with the usage of different software design paradigms and patterns.

PO3 Develop higher order research skills and innovative ideas to solve unknown problems through the application of appropriate research methodologies, techniques and tools.

PO4 Learn and Work in competing open ended environment with modern engineering and IT tools.

PO5 Obtain knowledge in cutting edge technologies to contribute positively towards collaborative multidisciplinary scientific research.

PO6 Acquire leadership skills and project management techniques to manage projects efficiently to work in teams.

PO7 Present their knowledge and ideas in any technical forum through the effective design of documents and reports.

PO8 Engage in lifelong learning with commitment to acquire knowledge of contemporary issues to meet the challenges in career.

PO9 Realize professional and ethical responsibility and act in accordance to social welfare.

PO10 Adopt Self learning abilities so as to educate or to guide others.

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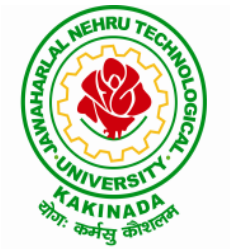
PROGRAMME SPECIFIC OUTCOMES

PSO1 Enhanced capability to develop computational tools and applications and improved skills to solve contemporary challenges.

PSO2 Exhibit attitude for continuous learning and deliver proactive solutions futuristic challenges.

PSO3 Be able to route their professional expertise to pursue higher studies and research programs.

R19
Curriculum
Structure & Syllabi



M. Tech.
(Information Technology)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Department of Computer Science & Engineering
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M. Tech. (IT) I SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	R19MIT1151	**Program Core-1** Advanced Data Structures and Algorithms	PC	3	0	0	3
2	R19MIT1152	**Program Core-2** Full Stack Technologies	PC	3	0	0	3
3	R19MIT1153	**Program Elective-1** 1. Advanced Graph Theory 2. Machine Learning with Python 3. Big Data Analytics	PE	3	0	0	3
4	R19MIT1154	**Program Elective-2** 1. Data Mining and Knowledge Discovery 2. Cryptography & Network Security 3. Object Oriented Software Engineering	PE	3	0	0	3
5	R19MIT1155	**Research Methodology and IPR**	CC			0	2
6	R19MIT1156	**Laboratory-1** Advanced Data Structures and Algorithms Lab	LB	0	0	4	2
7	R19MIT1157	**Laboartory-2** Full Stack Technologies Lab	LB	0	0	4	2
8	R19MIT1158	**Audit Course-1** 1. English for Research Paper Writing 2. Disaster Management 3. Sanskrit for Technical Knowledge 4. Value Education	AC	2	0	0	0
Total Credits							18

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M. Tech. (IT) II SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	R19MIT1251	**Program Core-3** Data Science	PC	3	0	0	3
2	R19MIT1252	**Program Core-4** Advanced Network Protocols	PC	3	0	0	3
3	R19MIT1253	**Program Elective-3** 1. High Performance Computing 2. Ad Hoc & Sensor Networks 3. Web Analytics and Development	PE	3	0	0	3
4	R19MIT1254	**Program Elective-4** 1. Cloud Computing 2. Internet of Things 3. GPU Computing	PE	3	0	0	3
5	R19MIT1255	**Laboratory-3** Data Science Lab	LB	0	0	4	2
6	R19MIT1256	**Laboartory-4** Advanced Network Protocols Lab	LB	0	0	4	2
7	R19MIT1257	**Mini Project with Seminar**	MP	2	0	0	2
8	R19MIT1258	**Audit Course-2** 1. Constitution of India 2. Pedagogy Studies 3. Stress Management by Yoga 4. Personality Development through Life Enlightenment Skills	AC	2	0	0	0
Total Credits							18

**Students are encouraged to go to Industrial Training/Internship for at least 2-3 months during semester break.*

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M. Tech. (IT) III SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	R19MIT2351	**Program Elective-5** 1. Web of Things 2. Deep Learning 3. MOOCs-1 (NPTEL/SWAYAM)	PE	3	0	0	3
2	R19MIT2352	**Open Elective** 1. MOOCs-2 (NPTEL/SWAYAM)-Any 12 Week Course on Engineering/ Management/ Mathematics offered by other than parent department 2. Course offered by other departments in the college	OE	3	0	0	3
3	R19MIT2353	**Dissertation-I/ Industrial Project**	PJ	0	0	20	10
Total Credits							16

**Students going for Industrial Project/Thesis will complete these courses through MOOCs*

M. Tech. (IT) IV SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	R19MIT2451	**Dissertation-II**	PJ	0	0	32	16
Total Credits							16

Open Electives offered by the Department of CSE for other Departments Students

1. Python Programming
2. Principles of Cyber Security
3. Internet of Things
4. Artificial Intelligence and Machine Learning

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Advanced Data Structures and Algorithms

Code: R19MIT1151

Course Objectives:

From the course the student will learn

- Single Linked, Double Linked Lists, Stacks, Queues, Searching and Sorting techniques, Trees, Binary trees, representation, traversal, Graphs- storage, traversal.
- Dictionaries, ADT for List, Stack, Queue, Hash table representation, Hash functions, Priority queues, Priority queues using heaps, Search trees.
- AVL trees, operations of AVL trees, Red- Black trees, Splay trees, comparison of search trees.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Ability to write and analyze algorithms for algorithm correctness and efficiency	K4
CO2	Master a variety of advanced abstract data type (ADT) and data structures and their Implementation.	K3
CO3	Demonstrate various searching, sorting and hash techniques and be able to apply and solve problems of real life	K2
CO4	Design and implement variety of data structures including linked lists, binary trees, heaps, graphs and search trees	K6
CO5	Ability to compare various search trees and find solutions for IT related problems	K5

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
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Syllabus

UNIT–I: Introduction to Data Structures- Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms, **Stacks and Queues-** Algorithm Implementation using Linked Lists.

UNIT–II: Searching- Linear and Binary, Search Methods, **Sorting-** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, **Trees-** Binary trees, Operations- Insertion, Deletion, Properties, Representation and Traversals (DFT, BFT), Expression Trees (Infix, prefix, postfix), **Graphs-** Basic Concepts, Storage structures and Traversals.

UNIT–III: Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, **Open Addressing-** Linear Probing, Double Hashing.

UNIT–IV: Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion, **Search Trees-** Binary Search Trees, Definition, ADT, Implementation, **Operations-** Searching, Insertion, Deletion.

UNIT–V: Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations-Insertion, Deletion and Searching. Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

Text Books:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, Richard F.Gilberg, Behrouz A. Forouzon, Cengage Learning, 2004
2. Data Structures, Algorithms and Applications in java, 2nd Edition, Sartaj Sahni, University Press/Orient BlackSwan, 2005

Reference Books:

1. Data Structures And Algorithm Analysis, 2nd Edition, Mark Allen Weiss, Pearson, 2002
2. Data Structures And Algorithms in C++, 3rd Edition, Adam Drozdek, Cengage Learning, 2005
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, 1st Edition, N.B.Venkateswarulu, E.V. Prasad, S Chand & Co, 2009
4. Classic Data Structures, 2nd Edition, Debasis Samantha, PHI Learning, 2009

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Full Stack Technologies

Code: R19MIT1152

Course Objectives:

From the course the student will learn

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client.
- Write backend code in Python/Java, PHP languages and Writing optimized front end code HTML and JavaScript.
- Understand, create and debug database related queries and Create test code to validate the applications against client requirement.
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Identify the Basic Concepts of Web & Markup Languages	**K3**
CO2	Develop web Applications using Scripting Languages & Frameworks	**K3**
CO3	Creating & Running Back-end scripts & Connecting to Databases	**K6**
CO4	Demonstrate Database Queries & DBMS and Working with JQuery Framework	**K2**
CO5	Adapt to Deployment Techniques & Working with cloud	**K6**

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Syllabus

UNIT–I: Introduction to web- Internet and world wide web, Domain name service, Protocols: HTTP, FTP, SMTP, **Html5** concepts, **CSS3**, Anatomy of a web page, **XML-** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT–II: Javascript- The Basics of Javascript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Patttern Matching using Regular Expressions, **Angular Java Script-** AngularJS Expressions: ARRAY, Objects, $eval, Strings, AngularJS Form Validation & Form Submission.

UNIT–III: PHP Programming: Back – end- Scripts PHP, Node js, **Working with PHP-** Using variables, Using constants, Data types, Operators. Conditional & Control statements, Arrays, functions. Working with forms and Databases such as MySQL, **Node.js-** Introduction, Advantages, Node.js Process Model, Node JS Modules.

UNIT–IV: JQuery: Introduction to JQuery, Syntax, Selectors & Events,
MySQL: Practice MySQL Queries, Aggregate Functions, Regular Expressions, Joins & Unions, Sub-Queries, Database Connectivity with MySql**.**

UNIT–V: Mongo DB- Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB, **Deploying Applications-** Web hosting & Domains, Deployment Using Cloud Platforms, **Web Services-** SOAP, WSDL and RESTful Architecture.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013
2. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.
3. Pro Mean Stack Development, 1st Edition, ELad Elrom, Apress O'Reilly, 2016
4. JavaScript & jQuery the missing manual, 2nd Edition, David sawyer mcfarland, O'Reilly, 2011
5. Web Hosting for Dummies, 1st Edition, Peter Pollock, John Wiley & Sons, 2013
6. RESTful web services, 1st Edition, Leonard Richardson, Ruby, O'Reilly, 2007

Reference Books:

1. Ruby on Rails Up and Running, Lightning fast Web development, 1st Edition, Bruce Tate, Curt Hibbs, Oreilly, 2006
2. Programming Perl, 4th edition, Tom Christiansen, Jonathan Orwant, O'Reilly ,2012
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech, 2009
4. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning, 2003

Web Reference Links:

1. http://www.upriss.org.uk/perl/PerlCourse.html

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Advanced Graph Theory

Code: R19MIT1153

Course Objectives:

From the course the student will learn

- All elementary concepts such as coloring, covering, hamiltonicity, planarity, connectivity and so on, it will also introduce the students to some advanced concepts.
- The student will know the definitions of relevant vocabulary and various algorithms from graph theory.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Demonstrate basic concepts in graph theory: coloring, planar graphs.	**K2**
CO2	Evaluate precise and accurate mathematical definitions of objects in graph theory.	**K5**
CO3	Determine and solve some real time problems using concepts of graph theory (e.g., scheduling problems).	**K5**
CO4	Build some classical graph algorithms in order to find sub graphs with desirable properties.	**K3**
CO6	Compile and deduce properties of chromatic numbers and polynomials and identify certain problems as graph colouring problems.	**K6**

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										
CO6										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Syllabus

UNIT–I: Basic Concepts- Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group, **Trees-** Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem.

UNIT–II: Connectivity- Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem, **Paths and Cycles-** Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Travelling Salesman problem, diameter and maximum degree.

UNIT–III: Matchings- Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem, **Extremal problems-** Independent sets and covering numbers, Turan's theorem, Ramsey theorems.

UNIT–IV: Colorings- Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem, **Graphs on surfaces-** Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces.

UNIT–V: Directed graphs- Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, **Networks and flows-** Flow cuts, max flow min cut theorem, **Selected topics-** Dominating sets, the reconstruction problem.

Text Books:

1. Introduction to Graph Theory, 2nd edition, Douglas B. West, Prentice Hall of India, 2000
2. Graph Theory with Applications to Engineering and Computer Science, 1st edition, Narsingh Deo, Prentice-Hall,2004

Reference Books:

1. Graph Theory, 1st edition, Frank Harary, Narosa, 2001
2. Network Flows: Theory, Algorithms, and Applications, 1st edition, R.Ahuja, T. Magnanti, and J. Orlin, Prentice-Hall, 1993

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Machine Learning with Python

Code: R19MIT1153

Course Objectives:

From the course the student will learn

- To learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
- To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extraction strategies.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Examine features that can be used for a particular machine learning approach in various IOT applications.	**K4**
CO2	To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.	**K2**
CO3	To mathematically analyze various machine learning approaches and paradigms.	**K4**
CO4	Demonstrate Deep Learning concepts and Feature Representation Learning	**K2**
CO5	Organize Scalable Machine Learning and classification methods for IOT	**K3**

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
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Syllabus

UNIT–I: Supervised Learning (Regression/Classification)- Basic methods- Distance-based methods, Nearest-Neighbours, Decision Trees, NaiveBayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

UNIT–II: Unsupervised Learning- Clustering- K-means/Kernel K-means, **Dimensionality Reduction-** PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models).

UNIT–III: Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, and Random Forests), **Python Libraries-** Introduction to Python Libraries-TensorFlow, PyTorch, Keras, Scikit-learn, NumPy, SciPy, Matplotlib, Pandas, Seaborn.

UNIT–IV: Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

UNIT–V: Scalable Machine Learning (Online and Distributed Learning)- A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference, Recent trends in various learning techniques of machine learning and classification methods for IOT applications, Various models for IOT applications.

Text Books:

1. Machine Learning: A Probabilistic Perspective, 1st edition, Kevin Murphy, MIT Press,2012
2. The Elements of Statistical Learning, 2nd edition, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer 2009 (freely available online)
3. Pattern Recognition and Machine Learning, 2nd edition, Christopher Bishop, Springer,2011
4. Programming Collective Intelligence: Building Smart Web 2.0 Applications ,1st edition, Toby Segaran, 2007
5. Building Machine Learning Systems with Python, 1st edition, Willi Richert, Luis Pedro Coelho, 2013
6. Applied Machine Learning, 1st edition, M. Gopal, Mc Graw Hill Education,2019

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Big Data Analytics

Code: R19MIT1153

Course Objectives:

From the course the student will learn

- To introduce students the concept and challenge of big data (3 V's: volume, velocity, and variety)
- To teach students in applying skills and tools to manage and analyze the big data.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Demonstrate the programming requirements viz., generic types and methods to perform data analysis.	K3
CO2	Organize the existing technologies and the need of distributed files systems to analyze the big data	K3
CO3	To demonstrate and analyze Map-Reduce programming model for better optimization.	K4
CO4	Collect, manage, store, query, and analyze big data; and identify the suitable functions / interfaces to perform I/O operations in Hadoop.	K4
CO5	Identify the need based tools, viz., Pig and Hive and to handle and formulate an effective strategy to implement a successful Data analytics project	K6

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT-I: Data structures in Java- Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types,

Generic Methods, Wrapper Classes, Concept of Serialization.

UNIT-II: Working with Big Data- Google File System, Hadoop Distributed File System (HDFS), Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing MapReduce Programs- A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of **Hadoop MapReduce-** Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner.

UNIT-IV: Hadoop I/O- The Writable Interface, Writable Comparable and comparators, **Writable Classes-** Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, **Implementing a Custom Writable-** Implementing a Raw Comparator for speed, Custom comparators.

UNIT-V: Pig- Hadoop Programming Made Easier- Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin,
Applying Structure to Hadoop Data with Hive- Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

Text Books:

1. Big Java, 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC, 2010
2. Hadoop: The Definitive Guide, 3rd Edition, Tom White, O'Reilly, 2012
3. Hadoop in Action ,1st edition, Chuck Lam, MANNING Publication, 2010
4. Hadoop for Dummies, 1st edition, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown and Rafael Coss, 2014

Reference Books:

1. Hadoop in Practice, 1st edition, Alex Holmes, MANNING Publication, 2012

2. Hadoop MapReduce Cookbook, 1st edition, Srinath Perera, Thilina Gunarathne, Packt Publishing,2013

Software Links:

1. Hadoop: http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Data Mining & Knowledge Discovery

Code: R19MIT1154

Course Objectives:

From the course the student will learn

- Multidisciplinary field of data mining, the general data features, techniques for data preprocessing, modelling, design architectures, general implementation of data warehouses and OLAP.
- The relationship between data warehousing and other generalization methods, data-cube technology & data cube computation, market basket analysis with many techniques for frequent item set mining.
- Classification including decision tree induction, Bayes classification, advanced methods for Bayesian belief networks.
- The concepts of data clustering include different methods of clustering such as k-means, k-mediods, DB scan algorithm.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Compare types of data, quality of data, suitable measures required to perform data analysis.	K2
CO2	Choose appropriate classification technique to perform classification, model building and evaluation.	K3
CO3	Make use of association rule mining techniques on categorical and continuous data.	K3
CO4	Identify and apply clustering algorithm (with open source tools), interpret, evaluate and report the result.	K3
CO5	Analyze and Compare anomaly detection techniques.	K4

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

Syllabus

UNIT–I: Introduction- Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

UNIT–II: Classification- Basic Concepts, Decision Trees and model evaluation, General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, evaluating the performance of classifier, Nearest Neighborhood classifier, Bayesian Classifier, **Support vector Machines-**Linear SVM, Separable and Non Separable case.

UNIT–III: Association Analysis- Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms, Handling Categorical, Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns.

UNIT–IV: Clustering- Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, **Cluster Evaluation-** Overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm.

UNIT–V: Anomaly Detection- Characteristics of Anomaly Detection Problems and Methods, Statistical Approaches, Proximity-based Approaches, Clustering-based Approaches and Reconstruction-based Approaches.

Text Books:

1. Introduction to Data Mining, 2nd edition, Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, 2018

Reference Books:

1. Fundamentals of data warehouses, 2nd edition, Jarke, Lenzerini, Vassiliou and Vassiliadis, Springer, 2013
2. Data Mining, Concepts and Techniques, 2nd edition, Jiawei Han, Micheline Kamber, and Elsevier, 2006

Suggested NPTEL Course and other Useful Websites:

1. https://nptel.ac.in/courses/106105174/
2. http://www.saedsayad.com/data_mining_map.html

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Cryptography & Network Security

Code: R19MIT1154

Course Objectives:

From the course the student will learn

- To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes.
- To explore message digests, public key algorithms, design issues.
- To explore working principles of various authentication protocols.
- To explore various secure communication standards including Kerberos, IPsec, and SSL/TLS.

Course Outcomes (COs):

CO	Course Outcomes	Knowledge Level (K)#
CO1	Explain different security threats and countermeasures and foundation course of cryptography mathematics.	K2
CO2	Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography	K4
CO3	Revise the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more	K6
CO4	Design applications of hash algorithms, digital signatures and key management techniques	K6
CO5	Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL,TSL, and IPsec .	K5

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

UNIT-I: Basic Principles- Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography- Integer Arithmetic, Modular Arithmetic, Matrices Linear Congruence, Algebraic Structures, GF(2^n) Fields, **Symmetric Encryption-** Mathematics of Symmetric Key Cryptography- Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

UNIT-II: Asymmetric Encryption- Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography- Introduction, RSA Cryptosystem, RABIN Cryptosystem, ELGAMAL Cryptosystem, Elliptic Curve Cryptosystems.

UNIT-III: Data Integrity, Digital Signature Schemes & Key Management- Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT-IV: Network Security-I- Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS, **Network Security-II-** Security at the Network Layer: IPSec, System Security, **Security at Transport Layer-** SSL and TLS.

UNIT-V: Abstract Models for BLOCKCHAIN, GARAY model, RLA Model, Proof of Work (PoW) as random oracle, formal treatment of consistency, liveness and fairness, Proof of Stake (PoS) based Chains, Hybrid models (PoW + PoS). Bitcoin, Wallet, Blocks, Merkley Tree, hardness of mining, transaction verifiability, anonymity, forks, double spending, mathematical analysis of properties of Bitcoin.

Text Books:

1. Cryptography and Network Security, 3rd Edition, Behrouz A Forouzan, Deb deep Mukhopadhyay, McGraw Hill, 2010
2. Cryptography and Network Security,6th Edition, William Stallings, Pearson, 2013
3. Bitcoin and cryptocurrency technologies: A comprehensive introduction,1st edition, Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, Princeton University Press, 2016
4. Everyday Cryptography, 1st edition, Keith M.Martin, Oxford, 2012

Reference Books:

1. Network Security and Cryptography, 1st edition, Bernard Meneges, Cengage Learning, 2010

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) I Semester

Object Oriented Software Engineering

Code: R19MIT1154

Course Objectives:

- To elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.
- To understand the what software life cycle is, how software projects are planned and managed, types of resources involved in software development projects, risks are identified and assessed, predictions and assessments are made.
- To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

Course Outcomes:

After the completion of the course, student will be able to

CO	Course Outcomes	Knowledge Level (K)#
CO1	Apply the Object Oriented Software-Development Process to design software	K3
CO2	Analyze and Specify software requirements through a SRS documents.	K4
CO3	Design and Plan software solutions to problems using an object-oriented strategy.	K6
CO4	Model the object oriented software systems using Unified Modeling Language (UML)	K3
CO5	Estimate the cost of constructing object oriented software.	K6

#based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

UNIT-I: Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering

Methodologies, Software Engineering Challenges. Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models, Process, use, applicability and Advantages/limitations.

UNIT-II: Object oriented Paradigm, Object oriented Concepts, Classes, Objects, Attributes, Methods and services, Messages, Encapsulation, Inheritance, Polymorphism, Identifying the elements of object model, management of object oriented Software projects, Object Oriented Analysis, Domain Analysis, Generic Components of OOA model,, OOA Process, Object Relationship model, Object Behavior Model.

UNIT-III: Object Oriented Design: Design for Object- Oriented systems, The Generic components of the OO design model, The System design process, The Object design process, Design Patterns, Object Oriented Programming.

UNIT-IV: Object Oriented testing: Broadening the view of Testing, Testing of OOA and OOD models, Object-Oriented testing strategies, Test case design for OO software, testing methods applicable at the class level, Interclass test case design.

UNI-V: Technical Metrics for Object Oriented Systems: The Intent of Object Oriented metrics, The distinguishing Characteristics, Metrics for the OO Design model, Class-Oriented metrics, Operation-Oriented Metrics, Metrics foe Object Oriented testing, Metrics for Object Oriented projects.
Computer-Aided Software Engineering: What is CASE?, Building blocks for CASE, A taxonomy of CASE tools, Integrated CASE environments, The Integration Architecture, The CASE Repository.

Text Books:

1. Object oriented and Classical Software Engineering, 7th ed, Stephen R. Schach,
   TMH, 2004
2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH, 2004
3. Software Engineering, 6th edition, Roger S Pressman, Tata McGraw Hill Edition, 2010

Reference Books:

1. Component based software engineering, 7th International symposium, ivicaCrnkovic, Springer, CBSE 2004
2. Software Engineering, , Ninth edition, Ian Sommerville, Pearson education, 2010

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Research Methodology and IPR

Code: R19MIT1155

Course Objectives:

From the course the student will learn

- The course has been developed with orientation towards research related activities and recognizing the ensuing knowledge as property.
- It will create consciousness for Intellectual Property Rights and its constituents.
- Learners will be able to perform documentation and administrative procedures relating to IPR in India as well as abroad.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Understand research problem formulation.	K3
CO2	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	K4
CO3	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.	K3
CO4	Analyze research related information	K6
CO5	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.	K3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
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Syllabus

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics.

UNIT-III: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV: Nature of Intellectual Property- Patents, Designs, Trade and Copyright, **Process of Patenting and Development-** technological research, innovation, patenting, development, **International Scenario-** International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V: Patent Rights- Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications, **New Developments in IPR-** Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Text Books:

1. Research methodology: an introduction for science & engineering students, 1st Edition, Stuart Melville, Wayne Goddard, 1996
2. "Research Methodology: An Introduction", Wayne Goddard and Stuart Melville
3. "Research Methodology: A Step by Step Guide for beginners", 2nd Edition, Ranjit Kumar

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) I Semester

Advanced Data Structures and Algorithms Lab

Code: R19MIT1156

Course Objectives:

From the course the student will learn

- Knowing about oops concepts for a specific problem.
- Various advanced data structures concepts like arrays, stacks, queues, linked lists, graphs and trees.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem.	**K2**
CO2	Examine algorithms performance using Prior analysis and asymptotic notations.	**K4**
CO3	Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)	**K3**
CO4	Apply and analyze functions of Dictionary	**K3**

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2											
CO3											
CO4											
CO5											

(Please fill the above with Levels of Correlation, viz., L, M, H)

List of Experiments

Experiment 1:

Write a java program to perform various operations on single linked list

Experiment 2:

Write a java program for the following

a) Reverse a linked list

b) Sort the data in a linked list

c) Remove duplicates
d) Merge two linked lists

Experiment 3:
Write a java program to perform various operations on doubly linked list.

Experiment 4:
Write a java program to perform various operations on circular linked list.

Experiment 5:
Write a java program for performing various operations on stack using linked list.

Experiment 6:
Write a java program for performing various operations on queue using linked list.

Experiment 7:
Write a java program for the following using stack
a) Infix to postfix conversion.
b) Expression evaluation.
c) Obtain the binary number for a given decimal number.

Experiment 8:
Write a java program to implement various operations on Binary Search Tree using Recursive and Non-Recursive methods.

Experiment 9:
Write a java program to implement the following for a graph.
a)BFS b)DFS

Experiment 10:
Write a java program to implement Merge & Heap Sort of given elements.

Experiment 11:
Write a java program to implement Quick Sort of given elements.

Experiment 12:
Write a java program to implement various operations on AVL trees.

Experiment 13:
Write a java program to perform the following operations:
a) Insertion into a B-tree b) Searching in a B-tree

Experiment 14:
Write a java program to implementation of recursive and non-recursive functions to Binary tree Traversals

Experiment 15:
Write a java program to implement all the functions of Dictionary (ADT) using Hashing.

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

Full Stack Technologies Lab

Code: R19MIT1157

Course Objectives:

From the course the student will

- Learn the core concepts of both the frontend and backend programming course.
- Get familiar with the latest web development technologies.
- Learn all about SQL and Mongo databases.
- Learn complete web development process.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Understand, analyze and apply the role of languages like HTML, CSS, XML.	K3
CO2	Review JavaScript, PHP and protocols in the workings of the web and web applications	K2
CO3	Recommend of Web Application Terminologies, Internet Tools, E – Commerce and other web services.	K5
CO4	Develop and Analyze dynamic Web Applications using PHP, MySql, Node & MongoDB	K6
CO5	Installing & Using Frameworks.	K6

#based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

List of Experiments

1. Design a web page consisting of
   a) Home page

b) Login page
c) Catalogue page

2. Design a webpage to Embed elements like google maps and youtube into the webpage and make them responsive.

3. Design a dynamic web page with validation using JavaScript.

4. Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
   a. Factorial of that number
   b. Fibonacci series up to that number
   c. Prime numbers up to that number
   d. Is it palindrome or not

5. Write JavaScript programs on Event Handling
   a. Validation of registration form
   b. Open a Window from the current window
   c. Change color of background at each click of button or refresh of a page
   d. Display calendar for the month and year selected from combo box
   e. On Mouse over event

6. Write an XML file which will display the Book information which includes the following:
   1) Title of the book
   2) Author Name
   3) ISBN number
   4) Publisher name
   5) Edition
   6) Price

   Write a Document Type Definition (DTD) to validate the above XML file.

7. Write a program to create Calculator Node.js Module with functions add, subtract & multiply and use the Calculator module in another Node.js file.

8. Write a Node.js for File System to perform the following operations
   i) Create a File
   ii) Read a File
   iii) Write to a File
   iv) Delete a File
9. Write a program to implement jQuery Selectors and Operations.

10. Write a program to implement jQuery Event Handling.

11. Write an example perl program to connect to a MySQl database table and execute simple commands.

12. Write a PHP program for registering users of a website and login.

13. User Authentication:
    Assume four users user1,user2,user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

    a. Write a program to Create a Cookie and add these four user id's and passwords to this Cookie.
    b. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
    If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ". Use init-parameters to do this.

14. Install a database (Mysql or Oracle):
    Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).

    a) Write a PHP program to connect to that database and extract data from the tables and display them.
    b) Experiment with various SQL queries.
    c) Insert the details of the users who register with the web site, Whenever a new user clicks the submit button in the registration page.

15. Write a PHP program which does the following job:
    Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (Similar to week8 instead of cookies).

Department of Computer Science & Engineering
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M. Tech. (IT) I Semester

English for Research Paper Writing

Code: R19MIT1158

Course Objectives:

From the course the student will learn

- Understand that how to improve your writing skills and level of readability.
- Learn about what to write in each section.
- Understand the skills needed when writing a Title, Ensure the good quality of paper at very first-time submission.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Understand that how to improve your writing skills and level of readability	**K2**
CO2	Learn about what to write in each section	**K3**
CO3	Understand the skills needed when writing a Title	**K5**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

UNIT–II: Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts Introduction.

UNIT–III: Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT–IV: Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

UNIT–V: Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions. Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

Text Books:

1. Writing for Science, 0th Edition, Yale University Press, Goldbort R 2006
2. How to Write and Publish a Scientific Paper,7th Edition, Cambridge UniversityPress, Day R 2006
3. Handbook of Writing for the Mathematical Sciences,2nd Edition, SIAM, Highman's book, Highman N 1998

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) I Semester

Disaster Management

Code: R19MIT1158

Course Objectives:

From the course the student will learn

- Learn To Demonstrate A Critical Understanding Of Key Concepts In Disaster Risk Reduction And Humanitarian Response.
- Critically Evaluate Disaster Risk Reduction And Humanitarian Response Policy And Practice From Multiple Perspectives.
- Develop An Understanding Of Standards Of Humanitarian Response And Practical Relevance In Specific Types Of Disasters And Conflict Situations.
- Critically Understand The Strengths And Weaknesses Of Disaster Management Approaches,
- Planning And Programming in Different Countries, Particularly Their Home Country Or The Countries They Work.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.	**K2**
CO2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	**K3**
CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	**K5**
CO4	Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work.	**K3**

#based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

Syllabus

UNIT–I: Introduction Disaster- Definition, Factors and Significance, Difference between Hazard and Disaster, **Natural and Manmade Disasters-** Difference, Nature, Types and Magnitude.

UNIT–II: Repercussions Of Disasters And Hazards- Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem, **Natural Disasters-** Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, **Man-made Disasters-** Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT–III: Disaster Prone Areas in India- Study Of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches, Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami, Post-Disaster Diseases And Epidemics, **Risk Assessment-** Disaster Risk, Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation, Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment, Strategies for Survival.

UNIT–IV: Disaster Preparedness And Management Preparedness- Monitoring Of Phenomena Triggering A Disaster Or Hazard, **Evaluation of Risk-** Application Of Remote Sensing, Data From Meteorological And Other Agencies, **Media Reports-** Governmental and Community Preparedness.

UNIT–V: Disaster Mitigation- Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation, Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

Text Books:

1. "Disaster Management in India: Perspectives, issues and strategies", R. Nishith, Singh AK, New Royal book Company
2. "Disaster Mitigation Experiences And Reflections", Sahni, Pardeep Et.Al. (Eds Prentice Hall Of India, New Delhi)

Reference Books:

1. "Disaster Administration And Management Text And Case Studies" , 1st ed, Goel S. L, Deep &Deep Publication Pvt. Ltd., New Delhi

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) I Semester

Sanskrit for Technical Knowledge

Code: R19MIT1158

Course Objectives:

From the course the student will learn

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world.
- Learning of Sanskrit to improve brain functioning.
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	To get a working knowledge in illustrious Sanskrit, the scientific language in the world	K2
CO2	Learning of Sanskrit to improve brain functioning	K3
CO3	Learning of Sanskrit to develop the logic in mathematics, science & other subjects	K5
CO4	The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature	K3

#based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: Alphabets in Sanskrit, Past/Present/Future Tense.

UNIT–II: Simple Sentences forming in Sanskrit.

UNIT–III: Order of Sanskrit sentences, Introduction of roots in Sanskrit language.

UNIT–IV: Technical information about Sanskrit Literature.

UNIT–V: Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics.

Text Books:

1. "Abhyaspustakam" , 1st ed, Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit", Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

Reference Books

1. "India's Glorious Scientific Tradition", Suresh Soni, Ocean books (P) Ltd., New Delhi

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) I Semester

Value Education

Code: R19MIT1158

Course Objective:

From the course the student will learn

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Knowledge of self-development	**K2**
CO2	Learn the importance of Human values	**K3**
CO3	Developing the overall personality	**K5**

#based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: Values and self-development, Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments

UNIT–II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance, Confidence, Concentration. Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity Patriotism. Love for nature, Discipline

UNIT–III: Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness.

Avoid fault Thinking.

UNIT–IV: Free from anger, Dignity of labour, Universal brotherhood and religious tolerance. True friendship, Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT–V: Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, studying effectively

Text Books:

1. "Values and Ethics for organizations Theory and practice", Chakroborty, S.K. Oxford University Press, New Delhi

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) II Semester

Data Science

Code: R19MIT1251

Course Objectives:

From the course the student will learn

- Provide you with the knowledge and expertise to become a proficient data scientist.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
- Produce Python code to statistically analyse a dataset;
- Critically evaluate data visualisations based on their design and use for communicating stories from data

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Acquire the knowledge and expertise to become a proficient data scientist	K3
CO2	Demonstrate an understanding of statistics and machine learning concepts that are vital for data science	K3
CO3	Explain how data is collected, managed and stored for data science	K2
CO4	Interpret the key concepts in data science, including their real-world applications and the toolkit used by data scientists	K2
CO5	Illustrate data collection and management scripts using MongoDB	K3

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

Syllabus

UNIT-I: Introduction to Core Concepts and Technologies- Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

UNIT-II: Data Collection and Management- Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, using multiple data sources.

UNIT III: Data Analysis- Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT-IV: Data Visualisation- Introduction, Types of data visualisation, **Data for visualisation-** Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT-V: Applications of Data Science- Technologies for visualisation, Bokeh (Python), recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

Text Books:

1. "The Art of Data Science", 1st edition, Roger D. Peng and Elizabeth matsui, Lean Publications, 2015
2. "Algorithms for Data Science", 1st edition, Steele, Brian, Chandler, John, Reddy, Swarna, springers Publications, 2016

Reference Books:

1. Doing Data Science: Straight Talk From The Frontline, 1st edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013
2. Mining of Massive Datasets, 2nd edition, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, v2.1, Cambridge University Press, 2014

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) II Semester

Advanced Network Protocols

Code: R19MIT1252

Course Objectives:

- To provide the student with knowledge of advanced network engineering concepts and techniques.
- To Understand the architecture of the Internet protocols as a layered model
- To understand the fundamentals of data transmission, encoding and multiplexing
- Students are able to identify the sources of threat and the points on a network where security is implemented.
- Ability to formulate and solve problems creatively, especially in network design, routing, management, security and performance.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Outline different layers of TCP/IP protocol stack	**K2**
CO2	Analyze the working principle of different protocols at different layers	**K4**
CO3	Adapt the concepts of networking protocols	**K6**
CO4	Evaluate the issues based on the Transport Layer Protocols	**K5**
CO5	Demonstrate the Application Layer Protocols	**K2**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

Syllabus

UNIT-I: Network Layer- Introduction, Address Resolution Protocol (ARP)- Address Mapping, ARP Protocol, Internet Control Message Protocol Version 4 (ICMPv4) **–**messages, packages, **Transport Layer-** Introduction- Transport-Layer Layer Services**,** Process-to-Process Communication, Addressing, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control, Error Control, Congestion Control, Transport-Layer Protocols.

UNIT-II: User Datagram Protocol- Introduction, User Datagram, UDP Services, **UDP Applications-** UDP Features, Typical Applications, **UDP Package-** Control-Block Table, Input Queues, Control-Block Module, Input Module, Output Module, Examples.

UNIT-III: Transmission Control Protocol- TCP Services, TCP Features, Segment, Flow Control, Error Control, Congestion Control, TCP Timers**,** Options, TCP Package.

UNIT-IV: Stream Control Transmission Protocol (SCTP)- Introduction, SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.

UNIT-V: Application Layer- Client-Server paradigm, peer-to-peer paradigm, **Host Configuration-** DHCP, introduction, operation, configuration, DNS, File transfer, WWW and HTTP, Electronic Mail, SNMP, Multimedia.

Text Books:

1. TCP/IP Protocol Suite, Fourth Edition, Behrouz A. Forouzan , Mcgraw Hill ,2009
2. Data Communications & Networking 5th edition, Behrouz A. Forouzan, Mcgraw Hill, 2012

Reference Books

1. Stream Control Transmission Protocol (SCTP): A Reference Guide,1st edition,Randall R.Stewart, Qiaobing Xie, 2001
2. Computer Networking: Principles, Protocols and Practice, Olivier Bonaventure, lulu.com, 2016

Web References:

1. https://vaibhav2501.files.wordpress.com/2012/02/tcp_ip-protocol-suite-4th-ed-b-forouzan-mcgraw-hill-2010-bbs.pdf
2. https://en.wikibooks.org/wiki/Network_Plus_Certification/Technologies/Common_Protocols

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

High Performance Computing

Code: R19MIT1253

Course Objectives:

From the course the student will learn

- The basic concepts related to HPC architecture and parallel computing.
- Discuss various computational techniques for studying soft matter systems.
- Apply these concepts to examine complex bimolecular/materials systems that generally require large-scale HPC platform with hybrid CPU-GPU architectures.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Design, formulate, solve and implement high performance versions of standard single threaded algorithms.	K6
CO2	Demonstrate the architectural features in the GPU and MIC hardware accelerators.	K2
CO3	Design programs to extract maximum performance in a multicore, shared memory execution environment processor.	K6
CO4	Analyze Symmetric and Distributed architectures.	K4
CO5	Develop and deploy large scale parallel programs on tightly coupled parallel systems using the message passing paradigm.	K6

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
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Syllabus:

UNIT-I: Graphics Processing Units- Introduction to Heterogeneous Parallel Computing, GPU architecture, Thread hierarchy, GPU Memory Hierarchy.

UNIT-II: GPGPU Programming- Vector Addition, Matrix Multiplication algorithms. 1D, 2D, and 3D Stencil Operations, Image Processing algorithms – Image Blur, Gray scaling. Histogramming, Convolution, Scan, Reduction techniques.

UNIT-III: Many Integrated Cores- Introduction to Many Integrated Cores. MIC, Xeon Phi architecture. Thread hierarchy. Memory Hierarchy. Memory Bandwidth and performance considerations.

UNIT-IV: Shared Memory Parallel Programming- Symmetric and Distributed architectures, OpenMP Introduction, Thread creation, Parallel regions, Work sharing, Synchronization.

UNIT-V: Message Passing Interface- MPI Introduction, Collective communication, Data grouping for communication.

Text Books:

1. Programming Massively Parallel Processors A Hands-on Approach, 3rd edition,Wen-Mei W Hwu, David B Kirk, Morgann Kaufmann,2016
2. Intel Xeon Phi Coprocessor Architecture and Tools, 1st edition ,RezaurRahman, Apress Open, 2013
3. Using OpenMP, Scientific and Engin edition, Barbara Chapman, Gabriele Jost, Ruud van der Pas, MIT Press, 2008

References:

1. Gropp, Lusk, Skjellum, Using MPI, Using MPI, 2014
2. Recent publications in IPDPS, PACT, and similar

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M. Tech. (IT) II Semester

Adhoc& Sensor Networks

Code: R19MIT1253

Course Objectives:

From the course the student will learn

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.	**K5**
CO2	Determine the principles and characteristics of wireless sensor networks.	**K5**
CO3	Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks.	**K6**
CO4	Illustrate the various sensor network Platforms, tools and applications.	**K4**
CO5	Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.	**K2**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
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Syllabus

UNIT-I: Introduction to Ad Hoc Wireless Networks- Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols.

UNIT-II: Routing Protocols for Ad Hoc Wireless Networks- Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT-III: Security protocols for Ad hoc Wireless Networks- Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT-IV: Basics of Wireless Sensors and Applications- The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT-V: Security in WSNs- Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, **Dataflow Style Language-** TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

Text Books:

1. Ad Hoc Wireless Networks – Architectures and Protocols, 1st edition, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, 2nd edition *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications / Cambridge University Press, March 2006
3. Wireless Sensor Networks – Principles and Practice, 1st edition, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

Reference Books:

1. Wireless Sensor Networks: An Information Processing Approach, 1st edition , *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, 1st edition, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3. Ad hoc Networking, 1st edition, *Charles E.Perkins*, Pearson Education, 2001
4. Wireless Ad hoc Networking, 1st edition, *Shih-Lin Wu, Yu-Chee Tseng,* Auerbach Publications, Taylor & Francis Group, 2007

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

Web Analytics and Development

Code: R19MIT1253

Course Objectives:

From the course the student will learn

- The course explores use of social network analysis to understand growing connectivity and complexity in the world ranging from small groups to WWW.

Course Outcomes: After completion of this course

CO	Course Outcomes	Knowledge Level (K)#
CO1	Become familiar with core research communities, publications, focused on web and social media analytics and research questions engaged in.	**K4**
CO2	To recognise the role of web analytics within the digital marketing landscape.	**K2**
CO3	Evaluate different types of software tools, techniques, and reports that are relevant to web analytics and understand the basics of how to apply them;	**K2**
CO4	Explain concepts clearly and critically apply findings.	**K6**
CO5	Plan the resources needed to capture, process and analyse data, and to evaluate and disseminate the outcomes.	**K3**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT-I: Introduction: Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization.

UNIT-II: Web Analytics tools- Click Stream Analysis, A/B testing, Online Surveys

UNIT-III: Web Search and Retrieval- Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models.

UNIT-IV: Making Connection- Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity.

UNIT-V: Connection- Connection Search, Collapse, Robustness Social involvements and diffusion of innovation.

Text Books:

1. Analyzing Social Media Networks with Node XL: Insights from a Connected World, 1st edition , Morgan Kaufmann, Hansen, Derek, Ben Sheiderman, Marc Smith, 2011
2. Web Analytics 2.0: The Art of Online Accountability, 1st edition, Avinash Kaushik, 2009
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World, Easley, 1st edition, D. & Kleinberg, J., New York,Cambridge University Press, 2010
   http://www.cs.cornell.edu/home/kleinber/networks-book/
4. Social network analysis: Methods and applications, 1st edition, Wasserman, S. & Faust, K. (1994). New York: Cambridge University Press, Monge, P. R. & Contractor, N. S., 2003
5. Theories of communication networks, 1st edition, New York: Oxford University Press, 2003

Department of Computer Science & Engineering
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(M. Tech. (IT) II Semester)

Cloud Computing

Code: R19MIT1254

Course Objectives:

From the course the student will learn

- The student will also learn how to apply trust-based security model to real-world security problems.
- An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures.
- Students will learn the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures.	K2
CO2	Design different workflows according to requirements and apply map reduce programming model.	K6
CO3	Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.	K4
CO4	Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds	K6
CO5	Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application	K5

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Syllabus

UNIT–I: Introduction- Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing, **Parallel and Distributed Systems-** Introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT-II: Cloud Infrastructure- At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Intercloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, **Cloud Computing-** Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research.

UNIT-III: Cloud Resource virtualization- Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, **Cloud Resource Management and Scheduling-** Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.

UNIT-IV: Storage Systems- Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, BigTable, Amazon Simple Storage Service(S3), **Cloud Security-** Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks**.**

UNIT-V: Cloud Application Development- Amazon Web Services- EC2, instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming, **Google-** Google App Engine, Google Web Toolkit,

MicroSoft- Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM.

Text Books:

1. Cloud Computing, Theory and Practice, 1st edition, Dan C Marinescu, MK Elsevier, Morgan Kaufmann, 2013
2. Cloud Computing, A Practical Approach, 1st edition, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH, 2009

Reference Books:

1. Mastering Cloud Computing, Foundations and Application Programming, 1st edition, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi , Morgan Kaufmann, 2013

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

Internet of Things

Code: R19MIT1254

Course Objectives:

From the course the student will learn

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Review Internet of Things (IoT).	**K2**
CO2	Demonstrate various business models relevant to IoT.	**K3**
CO3	Construct designs for web connectivity	**K6**
CO4	Organize sources of data acquisition related to IoT, integrate to enterprise systems.	**K4**
CO5	Describe IoT with Cloud technologies.	**K2**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: The Internet of Things- An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices, Internet Connectivity Principles, Internet connectivity, **Application Layer Protocols-** HTTP, HTTPS, FTP, Telnet.

UNIT–II: Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

UNIT-III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT-IV: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT-V: Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

Text Books:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Books:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things, CunoPfister , Oreilly

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) II Semester

GPU Computing

Code: R19MIT1254

Course Objectives:

From the course the student will learn

- To learn parallel programming with Graphics Processing Units (GPUs).

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Students would learn concepts in parallel programming.	K2
CO2	Implementation of programs on GPUs.	K3
CO3	Debugging and profiling parallel programs.	K6
CO4	Understand the role of visual effects in games and their connection to player experience.	K4
CO5	Understand how to use a GPU as a general processing device.	K2

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Syllabus

UNIT-I: Introduction- History, Graphics Processors, Graphics Processing Units, GPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps / Wavefronts, Thread blocks / Workgroups, Streaming multiprocessors, 1D / 2D / 3D thread mapping, Device properties, Simple Programs.

UNIT–II: Memory- Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories.

UNIT-III: Synchronization- Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU, **Functions-** Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.

UNIT-IV: Support- Debugging GPU Programs. Profiling, Profile tools, Performance aspects, **Streams-** Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based Synchronization -Overlapping data transfer and kernel execution, pitfalls.

UNIT-V: Case Studies- Image Processing, Graph algorithms, Simulations, Deep Learning, **Advanced topics-** Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing, Peer access, Heterogeneous processing.

Text Books:

1. Programming Massively Parallel Processors: A Hands-on Approach, 3rd edition, David Kirk, Wen-meiHwu, Morgan Kaufman, 2010 (ISBN:978-0123814722)
2. CUDA Programming: A Developer's Guide to Parallel Computing with GPUs, 1st edition, Shane Cook, Morgan Kaufman, 2012 (ISBN:978-0124159334)

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

Data Science Lab

Code: R19MIT1255

Course Objectives:

From the course the student will learn

- Describe supervised and unsupervised learning differences.
- Describe the data science life cycle.
- Use machine Take data science into production.
- Introducing data science, with a focus on the job outlook and market requirements.
- Hands-on Applied Statistics Concepts using Python.
- Graphics and Data Visualization Libraries in Python.
- Machine Learning algorithms, Models and Case Studies with Python.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Use Deep Learning techniques to build concise representations of the meanings of words in all significant languages.	**K3**
CO2	Use machine learning methods to solve the real-world problems.	**K3**
CO3	Develop a Back propagation algorithm	**K6**
CO4	Experiment with AI and data visualization techniques.	**K3**
CO5	Examine decision tree based Id3, Naive Bayes and K-Means Clustering.	**K4**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Description (If any):

- The programs can be implemented in either JAVA or Python.
- Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

List of Experiments

Experiment 1
Write a program to perform Data Preprocessing techniques.

Experiment 2
Write a program to implement following Feature Selection algorithms
a) Univariate selection b) RFE c) PCA d) Feature Importance
e)Correlation Matrix with Heatmap

Experiment 3
Write a program to perform Exploratory Data Analysis (EDA) for Classification using Pandas and Matplotlib

Experiment 4
Write a program to solve the real-world problems using the following machine learning methods:
a) Linear Regression b) Logistic Regression

Experiment 5
Write a program to implement Support Vector Machines.

Experiment 6
Write a program to implement the following
i) K-Means Clustering.
ii) k-Nearest Neighbor algorithm

Experiment 7
Implement and demonstrate the **FIND-S** algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file

Experiment 8
Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Experiment 9
Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

Experiment 10
Write a program to demonstrate the working of the decision tree based **Id3 algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Experiment 11
Write a program to implement the naïve Bayesian classifier for Iris data set. Compute the accuracy of the classifier, considering few test data sets.

Experiment 12
Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Experiment 13
Write a program to implement the following
i) Single and Multi Layer Neural Network.
ii)Perceptron Algorithm

Experiment 14
Implement a program using Perceptron Learning rule for linearly and non-Linearly Separable Problem.

Experiment 15
Write a program to simulate a perception network for pattern classification and function approximation.

Reference links:

1. https://medium.com/data-py-blog/
2. https://medium.com/ml-research-lab/
3. https://www.analyticsvidhya.com/
4. https://www.xenonstack.com/blog/
5. https://towardsdatascience.com/
6. https://realpython.com/

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) II Semester

Advanced Network Protocols Lab

Code: R19MIT1256

Course Objectives:

From the course the student will learn

- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms and know the concept of data transfer between nodes.
- able to analyse a communication system by separating out the different functions provided by the network, and understand that there are fundamental limits to any communications system;
- understand the general principles behind multiplexing, addressing, routing, reliable transmission and other stateful protocols as well as specific examples of each& understand what FEC is and how CRCs work;
- able to compare communications systems in how they solve similar problems;
- View of both the internal workings of the Internet and of a number of common Internet applications and protocols.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Demonstrate data link layer functionalities.	**K3**
CO2	Develop the client server application using socket programming.	**K6**
CO3	Choose routing protocols to solve real world problems.	**K5**
CO4	Evaluate FTP, DNS/ HTTP of application layer functionalities.	**K5**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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List of Experiments

Experiment 1
Write a program to implement Stop & Wait Protocol and Sliding Window Protocol.

Experiment 2
Write a program to Study Socket Programming using Client Server model.

Experiment 3
Write a code to simulate ARP /RARP protocols.

Experiment 4
Write a code to simulate PING and TRACEROUTE commands.

Experiment 5
Write a program to create a socket for HTTP for web page upload and download.

Experiment 6
Write a program to implement RPC (Remote Procedure Call).

Experiment 7
Write a program to implement Subnetting.

Experiment 8
Design applications using TCP Sockets like
a. Echo client and echo server b. Chat c. File Transfer

Experiment 9
Design applications using TCP and UDP Sockets like
a.DNS b. SNMP c. File Transfer

Experiment 10
Write a program to configure FTP Server using a FTP client/SFTP client.

Experiment 11
Write a program to configure a DNS server.

Experiment 12
Implement the client for Simple Mail Transfer Protocol (SMTP).

Experiment 13
Write a program to configure a mail server for IMAP/POP protocols and write a simple SMTP client to send and receive mails.

Experiment 14
Write a program to configure a DHCP server.

Experiment 15
Write a code how to create the socket and show the flow of the packets using TCP/IP protocols.

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

M. Tech. (IT) II Semester

Constitution of India

Code: R19MIT1258

Course Objectives:

From the course the student will learn

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: At the end of the course, student will be able to

CO	Course Outcomes	Knowledge Level (K)#
CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	K6
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	K6
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.	K6
CO4	Discuss the passage of the Hindu Code Bill of 1956.	K6
CO5	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	K6

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

Department of Computer Science & Engineering
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(Please fill the above with Levels of Correlation, viz., L, M, H)
Syllabus

UNIT–I:
History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

UNIT–II:
Philosophy of the Indian Constitution: Preamble, Salient, Features

UNIT–III:
Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT–IV:
Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, **Executive:** President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT–V:
Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT – VI:
Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1st Edition, (Bare Act), Government Publication, 1950
2. Framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, Dr. B. R. Ambedkar 2015
3. Indian Constitution Law, 7th Edition, M. P. Jain, Lexis Nexis, 2014

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

Pedagogy Studies

Code: R19MIT1258

Course Objectives:

From the course the student will learn

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?	K1
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?	K1
CO3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?	K1

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I:

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**,** Overview of methodology and Searching.

UNIT–II:
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT–III:
Evidence on the effectiveness of pedagogical practices: Methodology for the in depth stage: quality assessment of included studies, How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? , Theory of change, Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT–IV:
Professional development: Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT–V:
Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Text Books:
1. Classroom interaction in Kenyan primary schools, Ackers J, Hardman F, Compare, 31 (2): 245-261, 2001
2. Curricular reform in schools: The importance of evaluation, Agrawal M, Journal of Curriculum Studies, 36 (3): 361-379, 2004
3. Teacher training in Ghana: does it count? Multi-site teacher education research project (MUSTER) country report 1, Akyeampong K, London: DFID, 2003

Department of Computer Science & Engineering
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M. Tech. (IT) II Semester

Stress Management by Yoga

Code: R19MIT1258

Course Objectives:

From the course the student will learn

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Develop healthy mind in a healthy body thus improving social health also	K4
CO2	Improve efficiency	K2
CO3	achieve overall health of body and min	K3
CO4	overcome stress and to maintain peace of mind	K5

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus:

UNIT – I: Definitions of Eight parts of yoga. (Ashtanga).

UNIT – II: Yam and Niyam. Do`s and Don'ts in life.

UNIT – III: Ahinsa, satya, astheya, bramhacharya and aparigrahaShaucha, santosh, tapa, swadhyay,ishwarpranidhan.

UNIT –IV: Asan and Pranayam, Various yoga poses and their benefits for mind &body.

UNIT –V: Regularization of breathing techniques and its effects-Types of

pranayam.

Text Books:

1. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur

Reference Books:

1. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda,Advaita Ashrama(Publication Department),Kolkata

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M. Tech. (IT) II Semester

Personality Development through Life Enlightenment Skills

Code: R19MIT1258

Course Objectives:

From the course the student will learn

- To learn to achieve the highest goal happily.
- To become a person with stable mind, pleasing personality and determination.
- To awaken wisdom in students.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life	K2
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity	K3
CO3	Study of Neetishatakam will help in developing versatile personality of students.	K5

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I:

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT–II:
Approach to day to day work and duties.
Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48

UNIT–III:
Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23,35,
Chapter 18-Verses 45, 46, 48.

UNIT–IV:
Statements of basic knowledge.
Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
Chapter 12 -Verses 13, 14, 15, 16,17, 18

UNIT–V:
Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
Chapter 4-Verses 18, 38,39
Chapter18 – Verses 37,38,63

Text Books:
1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (PublicationDepartment), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath

Reference Books
1. Rashtriya Sanskrit Sansthanam, New Delhi

Department of Computer Science & Engineering
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M. Tech. (IT) III Semester)

Web of Things

Code: R19MIT2351

Course Objectives

From the course the student will learn

- Assess Advanced BI concepts and core IT concepts.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Demonstrate functional Requirements Middleware for IoT.	**K2**
CO2	Develop IOT Protocols for M2M and WSN.	**K6**
CO3	Compare and contrast Web of Things versus Internet of Things.	**K3**
CO4	Examine Business Models for the Internet of Things.	**K4**
CO5	Perform Storing and Retrieving data for Application Development.	**K3**

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

Unit-I: Introduction-Definitions and Functional Requirements, Motivation, Architecture, Web 3.0 View of IoT, Ubiquitous IoT Applications, Four Pillars of IoT, DNA of IoT, The Toolkit Approach for End-user Participation in the Internet of Things, **Middleware for IoT-**Overview, Communication middleware for IoT, IoT Information Security.

UNIT-II: IOT Protocols- Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards, Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Network layer, APS layer, Security.

Unit-III: Web of Things-Web of Things versus Internet of Things, Two Pillars of the Web, Architecture Standardization for WoT, Platform Middleware for WoT, Unified Multitier WoT Architecture, WoT Portals and Business Intelligence, **Cloud of Things-**Grid/SOA and Cloud Computing, Cloud Middleware, Cloud Standards, Cloud Providers and Systems, Mobile Cloud Computing, The Cloud of Things Architecture.

UNIT-IV: Integrated-Integrated Billing Solutions in the Internet of Things, Business Models for the Internet of Things, **Network Dynamics-**Population Models, Information Cascades, Network Effects, Structural Models, Cascading Behaviour in Networks, The Small-World Phenomenon.

Unit -V: Application Development- Intents and Services, Storing and Retrieving data, Communication via the Web, Notification and Alarms, Graphics and Multimedia, Telephony, Location based services Packaging and Deployment, Security and Hacking.

Text Books:

1. The Internet of Things in the Cloud, A Middleware Perspective, 1st edition, Honbo Zhou, CRC Press 2012
2. Architecture the Internet of Things, 1st edition, Dieter Uckelmann, Mark Harrison, Florian Michahelles, Springer, 2011

Reference Books:

1. Networks, Crowds, and Markets: Reasoning About a Highly Connected World, 1st edition, David Easley and Jon Kleinberg, Cambridge University Press, 2010
2. The Internet of Things: Applications to the Smart Grid and Building Automation, 2nd edition, Olivier Hersent, Omar Elloumi and David Boswarthick, Wiley, 2012
3. The Internet of Things – Key applications and Protocols, 2nd edition, Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley, 2012

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M. Tech. (IT) III Semester

Deep Learning

Code: R19MIT2351

Course Objectives:

From the course the student will learn

- The mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.
- Recent models from both supervised and unsupervised learning.
- Special emphasis will be on convolutional architectures, invariance learning, unsupervised learning and non-convex optimization.

Course Outcomes:

CO	Course Outcomes	Knowledge Level (K)#
CO1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	K2
CO2	Compute deep learning algorithms and solve real-world problems.	K3
CO3	Develop algorithms simulating human brain.	K6
CO4	Apply Neural Networks for problem solving.	K3
CO5	Examine the essentials of Deep Learning and Deep Network architectures.	K4
CO6	Define, train and use a Deep Neural Network for solving real world problems that require artificial Intelligence based solutions.	K3

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										
CO6										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Department of Computer Science & Engineering
University College of Engineering, JNT University Kakinada

Syllabus

UNIT-I: Introduction-Feed forward Neural networks-Gradient descent and the back propagation algorithm, Unit saturation, aka the vanishing gradient problem, and ways to mitigate it, RelU Heuristics for avoiding bad local minima, Heuristics for faster training, Nestors accelerated gradient descent, Regularization, Dropout.

UNIT-II: Convolutional Neural Networks-Architectures, convolution / pooling layers**, Recurrent Neural Networks-** LSTM, GRU, Encoder Decoder architectures

UNIT-III: Deep Unsupervised Learning-Auto encoders (standard, sparse, denoising,contractive, etc), Variational Auto encoders, Adversarial Generative Networks, Auto encoder and DBM.

UNIT-IV: Attention and memory models-Dynamic memory networks, Applications of Deep Learning to Computer Vision**,** Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, and video to text with LSTM models, Attention models for computer vision tasks.

UNIT-V: Applications of Deep Learning to NLP-Introduction to NLP and Vector Space Model of Semantics Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, Evaluations and Applications in word similarity, analogy reasoning ,Named Entity Recognition, Opinion Mining using Recurrent Neural Networks

Text Books :

1. "Deep learning", 1st edition, Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville, MIT Press, 2015
2. "Learning deep architectures for AI." , Bengio, Yoshua, Foundations and trends in Machine Learning 2.1,2009

Department of Computer Science & Engineering
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M. Tech. (IT) III Semester

Python Programming

Course Objectives:

- Knowledge and understanding of the different concepts of Python.
- Using the GUI Programming and Testing in real-time applications.
- Using package Python modules for reusability.

Course Outcomes: At the end of the course, student will be able to

	Course Outcomes	Knowledge Level (K)#
CO1	Understand and comprehend the basics of python programming.	K2
CO2	Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.	K3
CO3	Explain the use of the built-in data structures list, sets, tuples and dictionary.	K3
CO4	Make use of functions and its applications.	K3
CO5	Identify real-world applications using oops, files and exception handling provided by python.	K3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: Introduction- History of Python, Python Language, Features of Python, Applications of Python, Using the REPL (Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT–II: Types, Operators and Expressions-Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Control Flow- if, if-elif-else, for, while, break, continue, pass.

UNIT–III: Data Structures-Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences, Comprehensions.

UNIT–IV: Functions- Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Modules: Creating modules, import statement, from.. import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

UNIT–V: Object Oriented Programming OOP in Python-Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding, Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics, Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books

1. Python Programming: A Modern Approach, 1st edition, Vamsi Kurama, Pearson,2018
2. Learning Python, 5th edition, Mark Lutz, Orielly, 2013

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W. Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage

Department of Computer Science & Engineering
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M. Tech. (IT) III Semester

Principles of Cyber Security

Course Objectives:

1. To learn threats and risks within context of the cyber security architecture.
2. Student should learn and Identify security tools and hardening techniques.
3. To learn types of incidents including categories, responses and timelines for response.

Course Outcomes: At the end of the course, student will be able to

Course Outcomes		Knowledge Level (K)#
CO1	Apply cyber security architecture principles.	**K3**
CO2	Describe risk management processes and practices.	**K2**
CO3	Appraise cyber security incidents to apply appropriate response	**K5**
CO4	Distinguish system and application security threats and vulnerabilities.	**K4**
CO5	Identify security tools and hardening techniques	**K3**

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

Syllabus

UNIT–I: Introduction to Cyber security- Cyber security objectives**,** Cyber security roles**,** Differences between Information Security & Cyber security.

Cyber security Principles-Confidentiality, integrity, &availability Authentication & non repudiation.

UNIT–II: Information Security (IS) within Lifecycle Management-Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, Risks & Vulnerabilities-Basics of risk management**,** Operational threat environments**,** Classes of attacks.

UNIT–III: Incident Response- Incident categories**,** Incident response Incident recovery. Operational security protection: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT–IV: Threat Detection and Evaluation (DE): Monitoring- Vulnerability Management, Security Logs and Alerts, Monitoring Tools and Appliances**.** Analysis- Network traffic Analysis, packet capture and analysis

UNIT–V: Introduction to backdoor System and security-Introduction to metasploit, Backdoor, demilitarized zone(DMZ),Digital Signature, Brief study on Harding of operating system.

Text Books:

1. NASSCOM: Security Analyst Student Hand Book, Dec 2015
2. Information Security Management Principles, Updated Edition, David Alexander, Amanda Finch, David Sutton, BCS publishers, June 2013

Reference Books:

1. Cyber Security Fundamentals-Cyber Security, Network Security and Data Governance Security, 2nd Edition, ISACA Publishers, 2006

Department of Computer Science & Engineering
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M. Tech. (IT) III Semester

Internet of Things

Course Objectives:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

Course Outcomes: At the end of the course, student will be able to

Course Outcomes		Knowledge Level (K)#
CO1	Explain the definition and usage of the term 'the internet of things' in different contexts	K4
CO2	Discover the various network protocols used in IoT	K3
CO3	Be familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee	K4
CO4	Define the role of big data, cloud computing and data analytics in a typical IoT system.	K6
CO5	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software	K3

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

UNIT-I: The Internet of Things- An Overview of Internet of Things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices

UNIT-II: Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT-III: Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT-IV: Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT-V: Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications /Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

Text Books:

1. Internet of Things: Architecture, Design Principles And Applications, 1st edition, Rajkamal, McGraw Hill Higher Education, 2017
2. Internet of Things, 1st edition, A.Bahgya and V.Madisetti, Univesity Press, 2015
3. Internet of Things from Hype to Reality: The road to Digitization, 1st edition, Ammar Rayes Samersalam, Springer, 2017 edition

Reference Books:

1. Designing the Internet of Things,1st edition, Adrian McEwen and Hakim Cassimally, Wiley, 2013
2. Getting Started with the Internet of Things, 1st edition, CunoPfister , O'Reilly,2011
3. Internet of Things and Data Analytics Handbook, 1st edition, HWAIYU GENG, Wiley publications,2017

Department of Computer Science & Engineering
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M. Tech. (IT) III Semester

Artificial Intelligence and Machine Learning

Course Objectives:

- To learn the basic concepts and techniques of AI and machine learning
- To explore the various mechanism of Knowledge and Reasoning used for building expert system.
- To become familiar with supervised and unsupervised learning models
- To design and develop AI and machine learning solution using modern tools.

Course Outcomes: At the end of the course, student will be able to

Course Outcomes		Knowledge Level (K)#
CO1	Explain the fundamentals of AI and machine learning.	K2
CO2	Identify an appropriate AI problem solving method and knowledge representation technique.	K3
CO3	Identify appropriate machine learning models for problem solving.	K3
CO4	Design and develop the AI applications in real world scenario.	K6
CO5	Differentiate relationship between AI, ML, and Deep Learning,	K5

#Based on suggested Revised BTL

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

(Please fill the above with Levels of Correlation, viz., L, M, H)

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Syllabus:

UNIT–I: Introduction to AI- Definition, Problem, State space representation. Intelligent Systems: Categorization of Intelligent System, Components of AI Program, Foundations of AI, Applications of AI, Current trends in AI, Intelligent Agents: Anatomy, structure, Types.

UNIT–II: Problem solving-Solving problem by Searching: Problem Solving Agent, Formulating Problems. Uninformed Search Methods: Breadth First Search (BFS), Depth First Search (DFS), Depth Limited Search, Depth First Iterative Deepening (DFID), Informed Search Methods- Greedy best first Search, A* Search, Memory bounded heuristic Search. Local Search Algorithms and Optimization Problems- Hill climbing search Simulated annealing and local beam search.

UNIT–III: Knowledge and Reasoning-Knowledge based Agents, The Wumpus World, and Propositional logic**. First Order Logic**- Syntax and Semantic, Inference in FOL, Forward chaining, backward Chaining, Knowledge Engineering in First-Order Logic, Unification and Resolution.

UNIT–IV: Concepts of Machine learning -Supervised, unsupervised, semi-supervised, Rote learning, Reinforcement learning, Issues, steps and applications, Designing a learning System. Case study- hand written digit recognition, stock price prediction. Learning Models- Decision tree learning. Probabilistic Models, Deterministic Models, Hidden Markov Model, Reinforcement Learning-Model based learning, Temporal Difference Learning, Generalization, Partially Observable States.

UNIT–V: Artificial Neural Network: Introduction, neural network representation, Problems for neural network learning, perception, multilayer network & Back propagation Algorithm**.** Deep learning- Definition, relationship between AI, ML, and Deep Learning, Trends in Deep Learning.

Text Books:

1. Artificial Intelligence, 1st edition, Saroj Kaushik, CENGAGE Learning, 2011
2. Artificial Intelligence and Machine Learning, 1st edition, Vinod Chandra S.S., Anand Hareendran S, 2014
3. "Artificial Intelligence A Modern Approach" ,Second Edition, Stuart J. Russell and Peter Norvig, Pearson Education, 2009
4. "Machine Learning" ,1st edition, Tom M. Mitchell, McGraw-Hill, 1997

5. "Introduction to machine learning", 2nd edition, Ethem Alpaydin, The MIT Press, 2010

Reference Books:

1. "PROLOG Programming for Artificial Intelligence", Third Edition, Ivan Bratko, Pearson Education, McGraw Hill Education, 2002
2. "Artificial Intelligence ",Third Edition, Elaine Rich and Kevin Knight,2017
3. "Genetic Algorithms: Search, Optimization and Machine Learning", 1st edition, Davis E. Goldberg, Addison Wesley, N.Y., 1989