SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

Approved by A.I.C.T.E., New Delhi, Permanently Affiliated to JNT University, Ananthapuramu;
Accredited by NAAC with Grade-A, Accredited by NBA (ECE & CSE);
An ISO 9001:2015 Certified Institution, 2(f) & 12(B) recognition by UGC Act, 1956
NH-40, Nandyal-518501, Nandyal (Dist), A.P.

learn-Grow-Empower

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

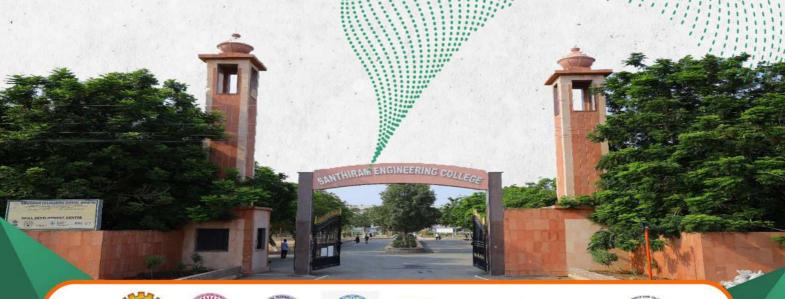## M.TECH (CSE-AI & ML)

REGULAR TWO YEAR PG DEGREE COURSE
(Applicable for the Batches Admitted from 2024-25)

REGULATIONS: R-23

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)
DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING (AI&ML)

M.Tech
III & IV-Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

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DEPARTMENT OF CSE - COMPUTER SCIENCE ENGINEERING (AI&ML)

M.Tech. III Sem. - Course Structure

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week			Credits	Marks		
				Lecture	Tutorial	Practical		Internal	External	Total
1	23D13301A	CC	APPLIED ARTIFICIAL INTELLIGENCE	3	0	0	3	40	60	100
2	23D58105	CC	NATURAL LANGUAGE PROCESSING	3	0	0	3	40	60	100
3	23D13301B	CC	GAME THEORY	3	0	0	3	40	60	100
4	23D58302A	OE	OPTIMIZATION TECHNIQUES	3	0	0	3	40	60	100
5	23D57302A	OE	INDUSTRIAL SAFETY	3	0	0	3	40	60	100
6	23D58302B	CC	DIGITAL MARKETING	3	0	0	3	40	60	100

M.Tech. IV Sem. - Course Structure

S.No	Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
			Lecture	Tutorial	Practical		Internal	External	Total
1.	23D513401	INDUSTRIAL INTERNSHIP	0	0	0	2	100	0	100
2.	23D513402	CO-CURRICULAR ACTIVITIES	0	0	0	2	100	0	100
3.	23D513403	DISSERTATION PHASE-II	0	0	32	16	100	100	200

M.Tech
III -Semester
Syllabus

SANTHIRAM ENGINEERING COLLEGE

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M.Tech. III Sem.

	L	T	P	C
	3	0	0	3

(23D13301A) APPLIED ARTIFICIAL INTELLIGENCE

Course Category	Core Course (CC)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:

1. To understand several data science concepts using python.
2. To understand Foundations of Natural Language processing and Machine Learning.
3. To design Supervised Learning Models.
4. To design Unsupervised Learning Models.
5. To analyze the feature engineering concept.

UNIT-I   FUNDAMENTALS OF PROGRAMMING

Python for data science- Introduction, Data Structures, Functions, Numpy, Matplotlib.

UNIT-II   DATA SCIENCE

Exploratory Data Analysis and Data Visualization- Plotting of Exploratory Data Analysis(EDA), Linear Algebra, Probability and Statistics, Dimensionality Reduction and Visualization, Principle Component Analysis(PCA), t-SNA(T- distributed Stochastic Neighbourhood Embedding.

UNIT-III   FOUNDATIONS OF NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING

Real world Problem- Predict rating, given product reviews on Amazon, Classification and Regression Models- K nearest Neighbors, Performance measurement of Models, Linear Regression, Logistic Regression, Solving Optimization problems.

UNIT-IV   MACHINE LEARNING (SUPERVISED LEARNING MODELS) , MACHINE LEARNING (UNSUPERVISED LEARNING MODELS)

Support Vector Machines, Decision Trees, Ensemble Models. Clustering, Hierarchical clustering, Density based clustering.

UNIT-V   FEATURE ENGINEERING-PRODUCT IONIZATION AND DEPLOYMENT OF ML MODELS

Factorization and Feature Engineering-Introduction, Moving window for time series data, Fourier Decomposition, Deep Learning features- LSTM, CNN.

TEXT BOOKS:

1. Applied Artificial Intelligence- A handbook for business leaders by mariya yao, marlene jia, Adelyn Zhou.

REFERENCE BOOKS:
1. Applied Artificial Intelligence by Professor Lewis Brown
2. Applied Machine Learning by M.Gopal, A tata Mc Grawhill edition.

e-Resources and Digital Material:
1. https://www.appliedaicourse.com/course/11/Applied-Machine-learning-course

COURSE OUTCOMES:
1. Understand several data science concepts using python.
2. Understand exploratory data analysis and data visualization
3. Understand Foundations of Natural Language Processing and Machine Learning.
4. Design Supervised Learning Models and Unsupervised Learning Models.
5. Analyze the feature engineering concept.

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	3	0	0	3

(23D58105) NATURAL LANGUAGE PROCESSING

Course Category	Core Course (CC)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:
1. Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
2. Discuss approaches to syntax and semantics in NLP
3. Examine current methods for statistical approaches to machine translation.
4. Teach machine learning techniques used in NLP.

UNIT-I   INTRODUCTION TO NATURAL LANGUAGE
The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

UNIT-II   GRAMMARS AND PARSING
Grammars and Parsing- Top-Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

UNIT-III   GRAMMARS FOR NATURAL LANGUAGE
Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT-IV   SEMANTIC INTERPRETATION, LANGUAGE MODELLING
Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts &embedded sentences, Defining semantics structure model theory
Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling Problems, Multilingual and Cross lingual Language Modelling

UNIT-V   MACHINE TRANSLATION
Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges

TEXT BOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, AksharBharathi, Vineetchaitanya, Prentice–Hall of India.

REFERENCE BOOKS:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106105158
2. http://ww25.nptelvideos.in/2012/11/natural-language-processing.html

COURSE OUTCOMES:

1. Understand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.
2. Apply the various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy.
3. Understand the fundamentals of CFG and parsers and mechanisms in ATN's.
4. Implement Semantic Interpretation and Explore Language Modelling Techniques.
5. Apply Machine Translation concepts.

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M.Tech. III Sem.

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	3	0	0	3

(23D13301B) GAME THEORY

Course Category	Core Course (CC)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:

1. To understand the fundamental concepts of game theory and their applications in strategic decision-making.
2. To analyze various solution concepts in game theory including Nash equilibrium and subgame perfect equilibrium.
3. To explore the computational complexity of game-theoretic problems and the algorithms used to solve them.
4. To study the application of regret minimization techniques in game theory and economics.
5. To examine the role of cooperative games and market algorithms in economic models.
6. To apply game-theoretic models to various practical scenarios, including routing games and graphical games.

UNIT-I   GAMES

Old and New Games, Strategies, Costs, and Payoffs; Basic Solution Concepts Finding Equilibria and Learning in Games

UNIT-II   REFINEMENT OF NASH

Games with Turns and Subgame Perfect Equilibrium; Nash Equilibrium without Full Information: Bayesian Games; Cooperative Games, Markets and Their Algorithmic Issues

UNIT-III   NASH-EQUILIBRIUM PROBLEM NP-COMPLETE CORRELATED EQUILIBRIA

Is the NASH-Equilibrium Problem NP Complete, The Lemke-Howson Algorithm, The Class PPAD, Succinct Representations of Games, The Reduction.
Bitmatrix Games and Best Response Condition, Equilibria Via Labeled Polytopes, The Lemke-Howson Algorithm, Integer Pivoting and Degenerate Games

UNIT-IV   EXTENSIVE GAME

Extensive Games and Their Strategic Form, Subgame Perfect Equilibria, Computing Equilibria with Sequence Form, Model and Preliminaries, External Regret Minimization

UNIT-V   EXTENSIVE GAME

Regret Minimization and Game Theory, Generic Reduction from External to Swap Regret, On the Convergence of Regret-Minimizing Strategies to Nash Equilibrium in Routing Games, Fisher's Linear Case and the Eisenberg–Gale Convex Program, Checking if Given Prices are Equilibrium Prices

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TEXT BOOKS:
1. "A Course in Game Theory" by Martin J. Osborne and Ariel Rubinstein
2. "Algorithmic Game Theory" edited by Noam Nisan, Tim Roughgarden, ??va Tardos, and Vijay V. Vazirani
3. "Game Theory: An Introduction" by Steven Tadelis

REFERENCE BOOKS:
1. "Theory of Games and Economic Behavior" by John von Neumann and Oskar Morgenstern
2. "Games and Decisions: Introduction and Critical Survey" by R. Duncan Luce and Howard Raiffa
3. "Game Theory for Applied Economists" by Robert Gibbons

e-Resources and Digital Material:
1. https://www.khanacademy.org/economics-finance-domain/microeconomics/nash - equilibrium-tutoria

COURSE OUTCOMES:
1. To explain the basic concepts of game theory and identify different types of games and strategies.
2. To find and refine equilibria in various game-theoretic models and cooperative games and understand market algorithms and their implications.
3. To evaluate the computational complexity of game-theoretic problems and utilize appropriate algorithms to solve them.
4. To implement game-theoretic concepts in real-world applications such as routing games and graphical games.
5. To apply regret minimization strategies to achieve equilibrium in games.

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(23D58302A) OPTIMIZATION TECHNIQUES

Course Category	Open Elective (OE)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:
1. To enumerate the fundamental knowledge of Linear Programming and Dynamic
2. To programming problems
3. To learn classical optimization techniques and numerical methods of optimization
4. To know the basics of different evolutionary algorithms
5. To explain Integer programming techniques and apply different optimization
6. To explore techniques to solve various models arising from engineering areas.

UNIT-I   LINER PROGRAMMING (L.P) DYNAMIC PROGRAMMING (D.P)
Revised Simplex Method, Duel simplex Method, Sensitivity Analysis
Multistage decision processes. Concepts of sub optimization, Recursive Relation-calculus method, tabular method, LP as a case of D.P.

UNIT-II   CLASSICAL OPTIMIZATION TECHNIQUES NUMERICAL METHODS FOR OPTIMIZATION
Single variable optimization without constraints, Multi variable optimization without constraints, multivariable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions.
Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method

UNIT-III   MODERN METHODS OF OPTIMIZATION GENETIC ALGORITHM (GA)
MODULE I
Differences and similarities between conventional and evolutionary algorithms, working principle, Genetic Operators- reproduction, crossover, mutation

UNIT-IV   MODERN METHODS OF OPTIMIZATION GENETIC PROGRAMMING (GP) INTEGER PROGRAMMING
MODULE II
 Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, Random population generation. Fuzzy Systems: Fuzzy set Theory, Optimization of Fuzzy systems
Graphical Representation, Gomory's Cutting Plane Method,Balas' Algorithm for Zero–One Programming, Branch-and-Bound Method.

UNIT-V APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS

Formulation of model- optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

TEXT BOOKS:
1. Engineering Optimization (4th Edition) by S.S.Rao, New Age International,

REFERENCE BOOKS:
1. Optimization for Engineering Design by Kalyanmoy Deb, PHI Publishers
2. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers
3. Operations Research by Hillar and Liberman, TMH Publishers
4. Optimal design – JasbirArora, McGraw Hill (International) Publisher

e-Resources and Digital Material:

COURSE OUTCOMES:
1. Explain the fundamental knowledge of Linear Programming and Dynamic Programming problems.
2. Use classical optimization techniques and numerical methods of optimization.
3. Describe the basics of different evolutionary algorithms
4. Compare GM and GP for generative fuzzy system optimization
5. Enumerate fundamentals of Integer programming techniques and solve various optimization problems arising from engineering areas

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(23D57302A) INDUSTRIAL SAFETY

Course Category	Open Elective (OE)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:
1. To know about Industrial safety programs and toxicology, Industrial laws ,regulations and source models
2. To understand about fire and explosion, preventive methods, relief and its sizing methods
3. To analyse industrial hazards and its risk assessment
4. To know about the industrial safety Act.

UNIT-I   INDUSTRIAL SAFETY
Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and fire fighting, equipment and methods

UNIT-II   FUNDAMENTALS OF MAINTENANCE ENGINEERING
Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III   WEAR AND CORROSION AND THEIR PREVENTION
Wear- types, causes, effects, wear reduction methods, lubricants types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods

UNIT-IV   FAULT TRACING

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automatic thermal and electrical equipment's like, i.Any one machine tool, ii.pump iii.Air compression iv.Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes

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UNIT-V   PERIODIC AND PREVENTIVE MAINTENANCE

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. i.Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Electrical Hazards and Safety, Radiation Hazard & Safety, Industrial Safety Act and Law, Industrial Disaster Management and Safety

TEXT BOOKS:
1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company

REFERENCE BOOKS:
1. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

e-Resources and Digital Material:
1. https://onlinecourses.nptel.ac.in/noc24_mg110/preview

COURSE OUTCOMES:
1. list out important legislations related to health, Safety and Environment.
2. Understand about tools used for maintenance engineering
3. Understand about reasons for corrosion and it's prevention
4. Understand about the false tracing
5. To list out requirements mentioned in factories act for the prevention of accidents and Understand the Industrial safety Act and Law

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(23D58302B) DIGITAL MARKETING

Course Category	Core Course (CC)
Course Enrichment Relevance	Employability

COURSE OBJECTIVES:
1. Understand the importance of digital marketing in today's rapidly changing business environment.
2. To analyze the Digital advertising Market in India
3. To implement the Search Engine optimization
4. To apply E-Mail marketing in business.
5. To understand Social media for brand conversations and buzz and implement recent trends in Digital marketing.

UNIT-I   FUNDAMENTALS OF DIGITAL MARKETING AND ITS SIGNIFICANCE
Traditional marketing Vs Digital Marketing, Evolution of Digital Marketing, Digital Marketing Landscape, Key Drivers, Digital Consumer & Communities.

UNIT-II   FUNDAMENTALS OF DIGITAL MARKETING AND ITS SIGNIFICANCE
The Digital users in India, Digital marketing Strategy- Consumer Decision journey,POEM Framework, Segmenting & Customizing messages, Digital advertising Market in India, Skills in Digital Marketing, Digital marketing Plan.

UNIT-III   SEARCH ENGINE OPTIMIZATION
Keyword Strategy- SEO Strategy - SEO success factors - On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works.

UNIT-IV   E- MAIL MARKETING
Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximizing email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based.
Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns.

UNIT-V   ENGAGEMENT MARKETING
Building Customer relationships - Creating Loyalty drivers - Influencer Marketing.
Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing

TEXT BOOKS:
1. Fundamentals of Digital Marketing by Puneet Singh Bhatia Publisher: Pearson Education; First edition (July 2017)

2. Digital Marketing by VandanaAhuja; Publisher: Oxford University Press (April 2015)

REFERENCE BOOKS:
1. Digital and Social Media Marketing: Emerging Applications and Theoretical Development,Nripendra P. Rana 2019

e-Resources and Digital Material:
1. Advanced Certificate in Digital Marketing and Communication
2. MICA, upGrad

COURSE OUTCOMES:
1. To examine and explore the role and importance of digital marketing in today's rapidly changing business environment.
2. To focuses on how digital marketing can be utilized by organizations and how its effectiveness can measured.
3. To know the Search Engine Marketing.
4. To study the Measuring and maximizing email campaign effectiveness.
5. To demonstrate advanced skills in common digital marketing tools and implement recent trends in Digital marketing.

SANTHIRAM ENGINEERING COLLEGE, NANDYAL
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VISION

❧ To become a nucleus for pursuing technical education and pool industrial research and developmental activities with social-conscious and global standards.

MISSION

M1: To provide Advanced Educational Programs and prepare students to achieve success and take leading roles in their chosen fields of specialization by arising a self-sustained University.

M2: To establish postgraduate programs in the current and Advanced Technologies.

M3: To establish an R&D Consultancy through developing Industry Institute Interaction, building up exceptional infrastructure.

M4: To propel every individual, realize and act for the technical development of the society

MOTTO

❧ **Education for Peace and Progress**

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