

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Semester -I

Name of the Course: M. Tech in Artificial Intelligence and Data Science			
Subject: Mathematical Foundations of Computer Science			
Course Code: PGCS (AI & DS)101		Semester: I	
Duration:36 Hrs.		Maximum Marks:100	
Teaching Scheme		Examination Scheme	
Theory:3		End Semester Exam:70	
Tutorial:0		Attendance: 5	
Practical:0		Continuous Assessment: 25	
Credit:3			
Aim:			
Sl. No.			
1.	To understand the basic notions of discrete and continuous probability.		
2.	To understand the methods of statistical inference, and the role that sampling distributions play in those methods.		
3.	To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.		
Objective:			
Sl. No.			
1.	To understand the mathematical fundamentals that are prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning		
2.	To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency.		
3.	To study various sampling and classification problems.		
Pre-Requisite:			
Sl. No.			
1.	Discrete Mathematics		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
1	Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains	7	12
2	Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood	7	12
3	Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of over fitting model assessment.	8	12
4	Graph Theory: Isomorphism, Planar graphs, graph colouring, Hamilton circuits and Euler cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems	3	12
5	Information Technology Applications, Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.	7	12
6	Recent Trends in various distribution functions in the mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.	4	10

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	Sub Total:	36	70				
	Internal Assessment Examination & Preparation of Semester Examination	4	30				
	Total:	40	100				
Assignments: Based on theory							
List of Books:							
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher				
1. John Vince	Foundation Mathematics for Computer Science	ISBN: 3319214365	Springer				
2. K. Trivedi.	Probability and Statistics with Reliability, Queuing, and Computer Science Applications.	2 nd Edition	Wiley				
3. M. Mitzenmacher and E. Upfal.	Probability and Computing: Randomized Algorithms and Probabilistic Analysis.	ISBN: 978 0521835404	Cambridge University Press				
4. Alan Tucker	Applied Combinatorics	ISBN: 9780470458389	Wiley				
End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of questions to be set	Total Marks	No of questions to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
B	ALL			5	3	45	
C	ALL						
<input type="checkbox"/> Only multiple-choice type questions (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.							
Examination Scheme for end semester examination:							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	ALL	1	10	10			
B	ALL	5	5	3			
C	ALL	15	5	3			

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech in Artificial Intelligence and Data Science			
Subject: Advanced Data Structures and Algorithms & Advanced Data Structures and Algorithms Lab			
Course Code: PGCS(AI & DS)102, PGCS(AI & DS)192		Semester: I	
Duration:36 Hrs.			
Teaching Scheme		Maximum Marks: 100+100	
Theory: 3		Examination Scheme	
Tutorial: 0		End Semester Exam:70	
Practical: 4		Attendance: 5	
Credit: 3+2		Continuous Assessment: 25	
		Practical /Sessional internal continuous evaluation: 40	
		Practical/ Sessional external examination: 60	
Aim:			
Sl. No.			
1.	Understand the implementation of symbol table using hashing techniques		
2.	Develop and analyze algorithms for red-black trees, B-trees, and Splay trees.		
3.	Develop algorithms for text processing applications.		
4.	Identify suitable data structures and develop algorithms for computational geometry problems.		
Objective:			
Sl. No.			
1.	Students should be able to choose appropriate data structures, understand the ADT/ libraries, and use it to design algorithms for a specific problem.		
2.	Students should be able to understand the necessary mathematical abstraction to solve the problems.		
3.	To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.		
4.	Students should be able to come up with analysis of efficiency and proof of correctness.		
Pre-Requisite:			
Sl. No.			
1.	UG Level Data Structures		
2.	Some knowledge of programming will be plus		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.	7	10
02	Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists	5	12
03	Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees	9	12
04	Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer- Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.	12	16

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05	Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Priority Search Tree, Range Trees, Quadtrees, k-D Trees.	10	15
06	Recent Computational Geometry: Triangulation, Voronoi Diagram, Convex Hull, Medial Axis and Skeletonization	5	5
	Sub Total:	48	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:	40	100

Practical:

Assignments (based on theory classes)

List of Books

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
1. Mark Allen Weiss	Data Structures and Algorithm Analysis in C++	2nd Edition	Pearson, 2004
2. M T Goodrich, Roberto Tamassia	Algorithm Design		John Wiley, 2002.
3. Computational Geometry: Algorithms and Applications	M. D. Berg, O. Cheong, M. v. Kreveld, M. Overmars	3 rd Edition	Springer
4. Advanced Data Structures	Peter Brass		Cambridge
5. Advanced Algorithms and Data Structures	M. L. Rocca		Manning Shelter Island

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	15	70
C	ALL			5	3	45	

- Only multiple-choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

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Internal Examination:		
Continuous evaluation		40
External Examination: Examiner-		
Signed Lab Assignments	10	
On Spot Experiment	40	
Viva voce	10	60

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Soft Computing and Soft Computing Lab			
Course Code: PGCS(AI & DS)103A, PGCS(AI & DS)193A		Semester: I	
Duration:36 Hrs.		Maximum Marks:100+100	
Teaching Scheme		Examination Scheme	
Theory:3		End Semester Exam:70	
Tutorial:0		Attendance: 5	
Practical:4		Continuous Assessment: 25	
Credit:3+2		Practical/ Sessional internal continuous evaluation:40	
		Practical /Sessional external examination: 60	
Aim:			
Sl. No.			
1.	Cover the concepts of Fuzzy Logic (FL), Artificial Neural Networks (ANNs) and Genetic Algorithm (GA).		
2.	Ability to apply Soft Computing techniques to solve a number of real-life problems.		
3.	Provide exposure to theory as well as practical systems and software used in soft computing.		
Objective:			
Sl. No.			
1.	To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.		
2.	To implement soft computing-based solutions for real-world problems.		
3.	To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.		
Pre-Requisite:			
Sl. No.			
1.	Basic mathematical logic.		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	INTRODUCTION TO SOFT COMPUTING: Evolution of Computing, Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics	7	10
02	FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making, Type II Fuzzy & its applications	8	16
03	NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks	8	16

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04	GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.	5	10
05	HYBRID SOFT COMPUTING TECHNIQUES: Introduction to Hybrid AI systems: Neuro- Fuzzy, Fuzzy-rough set systems, Neuro-Fuzzy-GA systems and case studies around Hybrid systems	4	10
06	APPLICATIONS: Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	4	8
Sub Total:		36	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		40	100

Practical:

Assignments (based on theory classes)

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Jyh:Shing Roger Jang, Chuen:Tsai Sun, Eiji Mizutani	Neuro-Fuzzy and Soft Computing	ISBN, 8120322436, 9788120322431	Prentice: Hall of India, 2008.
George J. Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic: Theory and Applications	ISBN: 0131011715	Prentice Hall, 1995.

End Semester Examination Scheme.

Maximum Marks-70.

Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	
C	ALL			5	3	15	70

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3

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Practical Internal Sessional Continuous Evaluation		
Internal Examination:		
Continuous evaluation		40
External Examination: Examiner-		
Signed Lab Assignments	10	
On Spot Experiment	40	
Viva voce	10	60

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Pattern Recognition and Pattern Recognition Lab			
Course Code: PGCS(AI & DS)103B, PGCS(AI & DS)193B		Semester: I	
Duration:36 Hrs.		Maximum Marks:100+100	
Teaching Scheme		Examination Scheme	
Theory:3		End Semester Exam:70	
Tutorial:0		Attendance: 5	
Practical:4		Continuous Assessment: 25	
Credit:3+2		Practical /Sessional internal continuous evaluation:40	
		Practical /Sessional external examination:60	
Aim:			
Sl. No.			
1.	Ability to Understand and apply both supervised and unsupervised classification methods to detect and characterize patterns in real-world data		
Objective:			
Sl. No.			
1.	Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms		
2.	Understand the basic methods of feature extraction, feature evaluation, and data mining.		
Pre-Requisite:			
Sl. No.			
1.	Fundamentals of Programming		
2.	Mathematics		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Unit 1: Introduction to pattern recognition: Basic concepts- Definitions, data sets for Pattern Recognition, Structure of a typical pattern recognition system. Different Paradigms of Pattern Recognition. Representations of Patterns and Classes. Metric and non-metric proximity measures.	6	14
02	Unit 2: Features selection: Feature vectors - Feature spaces - Different approaches to Feature Selection-Branch and Bound Schemes. Sequential Feature Selection.	6	14
03	Unit 3: Features extraction: Principal Component Analysis (PCA), Kernel PCA and Case studies	6	14
04	Unit 4: Pattern classification: Pattern classification using Statistical classifiers - Bayes' classifier - Classification performance measures – Risk and error probabilities. Linear Discriminant Function, Mahalanobis Distance, K- NN Classifier, Fisher's LDA, Single Layer Perceptron, Multi-layer Perceptron, Training set, test set; standardization and Normalization and Case studies	12	14
05	Unit 5: Clustering: Basics of Clustering; similarity / dissimilarity measures; clustering criteria. Different distance functions and similarity measures. K-means algorithm, K-medoids, DBSCAN and Case studies	6	14

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	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100
Practical:			
Assignments (based on theory classes)			
List of Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Sheldon M Ross	Introduction to Probability and Statistics for Engineers and Scientists	ISBN: 9780128177471	Elsevier Academic Press
R.O.Duda, P.E.Hart and D.G.Stork	Pattern Classification	ISBN: 0471056693	John Wiley, 2001
B. Lubanovic	Introducing Python	ISBN: 9781492051367	O'Reilly
Murray R. Spiegel, Larry J. Stephens	Schaum's Outlines on Statistics	ISBN: 0070602816 ISBN: 9780070602816	McGraw-Hill
Eric Matthes	Python Crash Course	2nd Edition	No Starch Press
List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer		
End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.			
Group	Unit	Objective Questions (MCQ only with the correct answer)	Subjective Questions
		No of question to be set	Total Marks
		No of question to be set	To answer
		Marks per question	Total Marks
A	ALL	10	10
B	ALL	5	3
C	ALL	5	3
		15	70
<input type="checkbox"/> Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.			
Examination Scheme for end semester examination:			
Group	Chapter	Marks of each question	Question to be set
A	ALL	1	10
B	ALL	5	5
C	ALL	15	5
Examination Scheme for Practical Sessional examination:			
Practical Internal Sessional Continuous Evaluation			
Internal Examination:			
Continuous evaluation			40
External Examination: Examiner-			
Signed Lab Assignments		10	
On Spot Experiment		40	
Viva voce		10	60

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Machine Learning and Machine Learning Lab			
Course Code: PGCS(AI & DS)103C, PGCS(AI & DS)193C		Semester: I	
Duration:36 hours		Maximum Marks:100+100	
Teaching Scheme		Examination Scheme	
Theory:3		End Semester Exam:70	
Tutorial:0		End Semester Exam:70	
Practical:4		Attendance: 5	
Credit:3+2		Continuous Assessment: 25	
		Practical /Sessional internal continuous evaluation:40	
		Practical/ Sessional external examination:60	
Aim:			
Sl. No.			
1.	Extract features that can be used for a particular machine learning approach in various AI applications.		
2.	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.		
3.	To mathematically analyze various machine learning approaches and paradigms.		
Objective:			
Sl. No.			
1.	To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various nodes.		
2.	To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.		
3.	Explore supervised and unsupervised learning paradigms of machine learning.		
4.	To explore Deep learning technique and various feature extraction strategies.		
Pre-Requisite:			
Sl. No.			
1.	Algorithm and Data Structure		
Contents			
Chapter	Name of the Topic	Hrs./week	Marks
01	Unit 1: Supervised Learning (Regression/Classification) <ul style="list-style-type: none"> • Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naïve Bayes • Linear models: Linear Regression, Logistic Regression, Generalized Linear Models • Support Vector Machines, Nonlinearity and Kernel Methods • Beyond Binary Classification: Multi-class/Structured Outputs, Ranking 	7	8
02	Unsupervised Learning <ul style="list-style-type: none"> • 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) 	6	12

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03	Evaluating Machine Learning algorithms and Model Selection, Ensemble Methods (Boosting, Bagging, Random Forests)	5	12
04	Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	4	10
05	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	4	12
06	Statistical Machine Learning: Density estimation, Gaussian processes: bivariate, multi-variate, Regression, Non-parametric Bayesian methods, Statistical distribution-based learning	5	8
07	Recent trends classification applications in various methods for learning techniques applications of machine learning.	5	8
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

Skills to be developed:

Intellectual skills

List of Practical

Based on Theory

Assignments: Based on Theory

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
1. Kevin Murphy	Machine Learning: A Probabilistic Perspective	ISBN 9780262018029	MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman,	The Elements of Statistical Learning,	2 nd Edition	Springer 2009
3. Christopher Bishop,	Pattern Recognition and Machine Learning	ISBN 9781493938438	Springer, 2007

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Desktop Computer
2.	GPU Workstation

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End Semester Examination Scheme.		Maximum Marks-70.		Time allotted-3hrs.			
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10	5	3	15	70
B	ALL			5	3	45	
C	ALL						
<input type="checkbox"/> Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.							
Examination Scheme for end semester examination:							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	ALL	1	10	10			
B	ALL	5	5	3			
C	ALL	15	5	3			
Examination Scheme for Practical Sessional examination:							
Practical Internal Sessional Continuous Evaluation							
Internal Examination:							
Continuous evaluation			40				
External Examination: Examiner-							
Signed Lab Assignments		10					
On Spot Experiment		40					
Viva voce		10		60			

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Data Mining			
Course Code: PGCS (AI &DS) 104A		Semester: I	
Duration: 36 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3		End Semester Exam: 70	
Tutorial: 0		Attendance: 5	
Practical: 0		Continuous Assessment: 25	
Credit: 3			
Aim:			
Sl. No.			
1.	Students should be able to understand different classes of problems concerning their computation difficulties		
2.	Ability to introduce the students to recent developments in the area of algorithmic design.		
Objective:			
Sl. No.			
1.	Introduce students to the advanced methods of designing and analyzing algorithms.		
2.	The student should be able to choose appropriate algorithms and use it for a specific problem.		
Pre-Requisite:			
Sl. No.			
1.	Understanding of basic logic and programming.		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Introduction, <ul style="list-style-type: none"> • Incremental & Stream Data Mining • Incremental Algorithms for Data Mining • Characteristics of Streaming Data • Issues and Challenges • Streaming Data Mining Algorithms • Any time stream Mining 	6	10
02	Distributed computing solutions for data mining <ul style="list-style-type: none"> • Map Reduce/Hadoop and Spark • Cluster Computing 	6	14
03	Mining Complex Structures <ul style="list-style-type: none"> • Algorithmic Development Issues • Mining trees • Tree Model Guided Framework • TMG framework for mining ordered & unordered sub tree • Tree Mining Applications • Mining Graphs o Approaches to graph mining 	6	14

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04	Sequence Mining <ul style="list-style-type: none"> • Characteristics of Sequence Data • Problem Modelling • Sequential Pattern Discovery • Timing Constraints • Applications in Bioinformatics 	6	14
05	Text Mining <ul style="list-style-type: none"> • Text Classification • Vector Space Model • Flat and Hierarchical Clustering • Web Search • Crawling & Indexing • Hyperlink Analysis • Page Rank algorithm • Web Search and Information Retrieval • Case Study: Query Recommender System 	6	14
06	Multivariate Time Series (MVTS) Mining <ul style="list-style-type: none"> • Importance of MVTS data • Sources of MVTS data • Mining MVTS data • Sign Language Data • Agro-meteorological Data 	6	4
Sub Total:		36	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		40	100

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Hadzic F., Tan H. & Dillon T. S	Mining data with Complex Structures	ISBN: 3642267033	Springer.
Yates R. B. and Neto B. R	Modern Information Retrieval	2 nd Edition	Pearson Education India

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			5	3	15	

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- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Computational Intelligence			
Course Code: PGCS(AI &DS)104B		Semester: I	
Duration: 36 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3		End Semester Exam: 70	
Tutorial: 0		Attendance: 5	
Practical: 0		Continuous Assessment: 25	
Credit: 3			
Aim:			
Sl. No.			
1.	Gain comprehensive theoretical knowledge as well as practical skills related to the design, implementation and analysis of CI approaches, algorithms and methods.		
2.	Explain, critically review, and discuss research papers in areas of CI; independently analyze research papers in areas of CI and write literature review papers on topics of CI		
Objective:			
Sl. No.			
1.	Gain comprehensive theoretical knowledge as well as practical skills related to the design, implementation and analysis of CI approaches, algorithms and methods.		
2.	Explain, critically review, and discuss research papers in areas of CI; independently analyze research papers in areas of CI and write literature review papers on topics of CI		
3.	Discuss and argue about current topics in CI;		
Pre-Requisite:			
Sl. No.			
1.	High-level programming language (like C, C++, or Java)		
Contents			
Chapter	Name of the Topic	Hrs./week	Marks
01	Introduction to Computational Intelligence Introduction, Overview of Computational Intelligence (CI)- Problems of CI, CI technique, Tic -Tac - Toe problem. Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.	6	14
02	Artificial Neural Networks Basic concepts of Neural networks, mathematical model, Typical architectures: single layer, multilayer, Common activation functions; basic models, Perceptron, Multilayer feed forward network, Back propagation, ADALINE, MADALINE, Different issues regarding convergence of Multilayer Perceptron, Competitive learning, Self-Organizing Feature Maps. Classification techniques: Different learning methods: Supervised, Unsupervised & reinforced; Simple Clustering algorithm, k-means & k-medoid based algorithm. Deep learning: Motivation, Deep Convolutional Networks, Recurrent Nets, Deep Learning Use Cases.	6	14
03	Genetic Algorithms Evolutionary and Stochastic techniques: Genetic Algorithm (GA), role of GA in optimization, Fitness function, Selection of initial population, Cross over, Mutation, Inversion, Deletion, Schema theorem and convergence of Genetic Algorithm, Simulated annealing and Stochastic models, multi objective evolutionary algorithm (MOEA)	6	14

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04	Swarm Optimization Particle Swarm Optimization (PSO): Principles of Bird Flocking and Fish Schooling, Evolution of PSO, Operating Principles, PSO Algorithm, Neighborhood Topologies, Convergence Criteria, Variations of PSO. Ant Colony Optimization (ACO) - Theoretical Considerations, Combinatorial optimization and meta heuristic, Stigmergy, Convergence Proofs, ACO Algorithm, ACO and Model Based Search, Variations Of ACO: Elitist Ant System (EAS), Minmax Ant System (MMAS) and Rank Based Ant Colony System (RANKAS),	6	10
05	Fuzzy Systems Fuzzy sets and Fuzzy logic, Fuzzy sets versus crisp sets, membership function, operations on fuzzy sets, linguistic variable, Fuzzy relations — Cartesian product, Operations on relations; Extension principle, Defuzzification methods. Applications, fuzzy controllers, fuzzy pattern recognition and image processing	6	4
06	Hybridization of CI Algorithms Hybrid Systems, Neural-Network-Based Fuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Design and Learning, Fuzzy Logic and Genetic Algorithm for Optimization, Applications.	6	14
Sub Total:		36	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		40	100

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Andries P. Engelbrecht	Computational Intelligence: An Introduction	2 nd Edition	Wiley
Ritch & Knight	Artificial Intelligence	3 rd Edition	McGraw Hill Education
Nils Nilsson	Artificial Intelligence	1 st Edition	Elsevier

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	
C	ALL			5	3	15	70

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:				
Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3
Examination Scheme for Practical Sessional examination:				
Practical Internal Sessional Continuous Evaluation				
Internal Examination:				
Continuous evaluation				40
External Examination: Examiner-				
Signed Lab Assignments		10		
On Spot Experiment		40		
Viva voce		10		60

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Natural Language Processing			
Course Code: PGCS (AI &DS)104C		Semester: I	
Duration: 36 Hrs.		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 3		End Semester Exam: 70	
Tutorial: 0		Attendance: 5	
Practical: 0		Continuous Assessment: 25	
Credit: 3			
Aim:			
Sl. No.			
1.	Understand the semantic for language processing.		
2.	Apply NLP for language processing.		
Objective:			
Sl. No.			
1.	Gain an in-depth understanding of the computational properties of natural languages.		
2.	Understanding semantics and pragmatics of English language for processing		
3.	How key concepts from NLP are used to describe and analyze language		
4.	POS tagging and context free grammar for English language.		
5.	Gain an in-depth understanding of the computational properties of natural languages.		
Pre-Requisite:			
Sl. No.			
1.	Mathematics & Programming concept		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Introduction- Human languages, models, ambiguity, processing paradigms; Phases in natural language processing, applications. Text representation in computers, encoding schemes.	6	10
02	Linguistics resources- Introduction to corpus, elements in balanced corpus, TreeBank, PropBank, WordNet, VerbNet etc. Resource management with XML, Management of linguistic data with the help of GATE, NLTK. Regular expressions, Finite State Automata, word recognition, lexicon.	6	12

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

A	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous Evaluation	40
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External Examination: Examiner-

Signed Lab Assignments	10	
On Spot Experiment	40	
Viva voce	10	60

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Research Methodology and IPR			
Course Code: PGCS (AI &DS)105		Semester: I	
Duration: 36 hours		Maximum Marks:100	
Teaching Scheme		Examination Scheme	
Theory:2		End Semester Exam:70	
Tutorial:0		End Semester Exam:70	
Practical:0		Attendance: 5	
Credit: 2		Continuous Assessment: 25	
Aim:			
Sl. No.			
1.	Understand research problem formulation		
2.	Analyze research related information		
3.	Follow research ethics		
Objective:			
Sl. No.			
1.	Understand research problem formulation		
2.	Analyze research related information		
3.	Follow research ethics		
4.	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity		
5.	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular		
6.	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		
Pre-Requisite:			
Nil			
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	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.	6	14
02	Effective literature studies approach, analysis Plagiarism, Research ethics	6	10
03	Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	6	14
04	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.	6	14
05	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	6	14

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

06	New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.	6	4				
Sub Total:		36	70				
Internal Assessment Examination & Preparation of Semester Examination		4	30				
Total:		40	100				
Practical: Skills to be developed: List of Practical: Based on theory Assignments: Based on theory List of Books:							
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher				
Wayne Goddard and Stuart Melville	Research Methodology: An Introduction	2 nd Edition	Juta Academic				
Ranjit Kumar	Research Methodology: A Step by Step Guide for Beginners	4 th Edition,	SAGE Publications Pvt. Ltd				
Asimov	Introduction to Design		Prentice Hall				
Stuart Melville and Wayne Goddard	Research methodology: an introduction for science & engineering students	2nd Edition	Juta Academic				
Robert P. Merges, Peter S. Menell, Mark A. Lemley	Intellectual Property in New Technological Age		Aspen Law & Business				
Halbert	Resisting Intellectual Property		Taylor & Francis Ltd.				
Niebel	Product Design		McGraw Hill				
End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	All	10	10	5	3	15	70
B	All			5	3	45	
C	All						
<input type="checkbox"/> Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.							
Examination Scheme for end semester examination:							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	ALL	1	10	10			
B	ALL	5	5	3			
C	ALL	15	5	3			

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: English for Research Paper Writing			
Course Code: PGCS(AI & DS)106A		Semester: I	
Duration: 24 hours		Maximum Marks:100	
Teaching Scheme		Examination Scheme	
Theory:02		End Semester Exam:70	
Tutorial: 0		End Semester Exam:70	
Practical: 0		Attendance: 5	
Credit: 0		Continuous Assessment: 25	
Aim:			
Sl. No.			
1.	Understand that how to improve your writing skills and level of readability		
2.	Learn about what to write in each section		
3.	Understand the skills needed when writing a Title Ensure the good quality of paper atvery first-time submission		
Objective:			
Sl. No.			
1.	Understand that how to improve your writing skills and level of readability		
2.	Learn about what to write in each section		
3.	Understand the skills needed when writing a Title Ensure the good quality of paper atvery first-time submission		
Pre-Requisite:			
Sl. No.			
1.	Basic Knowledge of English		
Contents			
Chapter	Name of the Topic	Hrs./week	
		Hours	Marks
01	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4	14
02	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4	14
03	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4	10
04	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,	4	4
05	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	4	14
06	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4	14
	Sub Total:	24	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	28	100

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Assignments: Based on theory							
List of Books:							
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher				
1. Goldbort R	Writing forScience		Yale University Press				
2. Day R	How to Write and Publish a Scientific Paper		Cambridge University Press				
3. Highman N	Handbook ofWriting for the Mathematical Sciences		SIAM. Highman's book.				
4. Adrian Wallwork	English for Writing Research Papers		Springer				
End Semester Examination Scheme.		Maximum Marks-70.			Time allotted-3hrs.		
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			5	3	15	
<input type="checkbox"/> Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.							
Examination Scheme for end semester examination:							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	ALL	1	10	10			
B	ALL	5	5	3			
C	ALL	15	5	3			

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Disaster Management			
Course Code: PGCS(AI & DS)106B		Semester: I	
Duration:24 hrs		Maximum Marks:100	
Teaching Scheme		Examination Scheme	
Theory:02		End Semester Exam:70	
Tutorial:0		End Semester Exam:70	
Practical:0		Attendance: 5	
Credit: 0		Continuous Assessment: 25	
Aim:			
Sl. No.			
1.	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response		
2.	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 in		
Objective:			
Sl. No.			
1.	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.		
2.	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.		
Pre-Requisite:			
	Nil		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude. 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 disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4	16
02	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	4	17
04	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.	4	15

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

05	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	4	8
06	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	4	14
Sub Total:		24	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		28	100

Assignments: Based on theory

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
1. R. Nishith, Singh AK,	Disaster Management in India: Perspectives, issues and strategies		New Royal book Company.
2. Sahni, Pardeep et.al. (Eds.)	Disaster Mitigation Experiences and Reflections		Prentice Hall of India, New Delhi.
3. Goel S. L.	Disaster Administration and Management Text and Case Studies		Deep & Deep Publication Pvt. Ltd., New Delhi.

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	
C	ALL			5	3	15	70

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Sanskrit for Technical Knowledge			
Course Code: PGCS(AI & DS)106C			
Duration: 24 hours	Semester: I		
Teaching Scheme	Maximum Marks:100		
Theory:02	Examination Scheme		
Tutorial:0	End Semester Exam:70		
Practical:0	End Semester Exam:70		
Credit: 0	Attendance: 5		
		Continuous Assessment: 25	
Aim:			
Sl. No.			
1.	Understanding basic Sanskrit language		
2.	Ancient Sanskrit literature about science & technology can be understood		
3.	Being a logical language will help to develop logic in students		
Objective:			
Sl. No.			
1.	To get a working knowledge in illustrious Sanskrit, the scientific language in the world		
2.	Learning of Sanskrit to improve brain functioning		
3.	Learning of Sanskrit to develop the logic in mathematics, science & other subjects		
4.	Enhancing the memory power		
5.	The engineering scholars equipped with Sanskrit will be able to explore huge knowledge		
Pre-Requisite:			
	Nil		
Contents			
			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> • Alphabets in Sanskrit, • Past/Present/Future Tense, • Simple Sentences 	8	25
02	<ul style="list-style-type: none"> • Order • Introduction of roots • Technical information about Sanskrit Literature 	8	25
03	<ul style="list-style-type: none"> • Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics 	8	20
Sub Total:		24	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		28	100
Assignments: Based on theory			
List of Books:			
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
1. Dr.Vishwas, Sanskrita Sansthanam,	Abhyaspustakam		Bharti Publication, New Delhi

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

2.	Prathama Deeksha	Teach Yourself Sanskrit		Vempati Kutumbshastri, Rashtriya Sanskrit			
3.	Suresh Soni	India's Glorious Scientific Tradition		Ocean books (P) Ltd., New Delhi.			
End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.							
Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	70
C	ALL			5	3	15	
<input type="checkbox"/> Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part. <input type="checkbox"/> Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.							
Examination Scheme for end semester examination:							
Group	Chapter	Marks of each question	Question to be set	Question to be answered			
A	ALL	1	10	10			
B	ALL	5	5	3			
C	ALL	15	5	3			

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

Name of the Course: M. Tech. in Artificial Intelligence and Data Science			
Subject: Value Education			
Course Code: PGCS (AI & DS) 106D		Semester: I	
Duration: 36 hours		Maximum Marks:100	
Teaching Scheme		Examination Scheme	
Theory: 2		End Semester Exam:70	
Tutorial:0		Attendance: 5	
Practical:0		Continuous Assessment: 25	
Credit:0			
Aim:			
Sl. No.			
1.	Knowledge of self-development		
2.	Learn the importance of Human values		
3.	Developing the overall personality		
Objective:			
Sl. No.			
1.	Understand value of education and self- development		
2.	Imbibe good values in students		
3.	Let the should know about the importance of character		
Pre-Requisite:			
	Nil		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> • 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 	6	10
02	<ul style="list-style-type: none"> • 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 	6	20
03	<ul style="list-style-type: none"> • Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline • Punctuality, Love and Kindness • Avoid fault Thinking • 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 	6	20

Syllabus for M. Tech. in Artificial Intelligence & Data Science (AI & DS)

04	<ul style="list-style-type: none"> • 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 	6	20
Sub Total:		24	70
Internal Assessment Examination & Preparation of Semester Examination		4	30
Total:		28	100

Assignments: Based on theory

List of Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Chakroborty, S.K.	Values and Ethics for organizations Theory and practice		Oxford University Press, New Delhi

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	
C	ALL			5	3	15	70

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	ALL	1	10	10
B	ALL	5	5	3
C	ALL	15	5	3