T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020) TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B. Tech. Artificial Intelligence and Machine Learning							**T.T. SEM:** V		
Course Name: Soft Skills and Interpersonal Communication							**Course Code:** HSMC-AIML501		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment/ Evaluation**				
Hours Per Week					**Theory (50)**		**Practical/ Oral**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration – 1.5 Hour **ESE: End Semester Examination - Paper Duration - 3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)									
Prerequisite- Basic knowledge of English language, Grammar and Vocabulary									

Course Objective: The course intends to understand basics of soft skills, learn essential life skills, understand and develop self and incorporate ethics and etiquette in day to day life

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive level attainment as per revised Bloom Taxonomy
1	Understand basics of soft skills	L1, L2, L3
2	Learn essential life skills	L1, L2, L3
3	Understand and develop self	L1, L2, L3
4	Understand others with empathy	L1, L2, L3
5	Use employment skills for placement and higher studies	L1, L2, L3
6	Incorporate ethics and etiquette in day to day life	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive level attainment as per revised Bloom Taxonomy
1.0	**Introduction to Soft Skills** 1.1 Meaning and Concept 1.2 Importance of soft Skills 1.3 Soft Skills for Lifelong learning- Building a better world	5	L1, L2
2.0	**Essential Soft Skills** 2.1 Personal integrity 2.2 Taking responsibility 2.3 Professionalism 2.4 Communication 2.5 Critical Thinking 2.6 Creativity and Innovation	8	L1, L2, L3
3.0	**Self-Development** 3.1 Self-assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. 3.2 Personal memory 3.3 Rapid reading & Taking notes 3.4 Complex problem solving 3.5 Creativity	8	L1, L2, L3
4.0	**Introduction to Interpersonal Skills** 4.1 Team work: Mentorship, Motivation 4.2 Problem Solving 4.3 Decision Making 4.4 Time Management 4.5 Emotional Intelligence 4.6 Negotiation Skills 4.7 Stress Management	8	L1, L2, L3
5.0	**Employability Skills** 5.1 Cover letter 5.2 Resume 5.3 Group Discussion 5.4 Presentation skills 5.5 Interview skills	8	L1, L2, L3
6.0	**Introduction to Corporate Ethics and Etiquette** 6.1 Business etiquette (meeting etiquette, Dining etiquette, Interview etiquette, Professional and work etiquette and Social Skills) 6.2 Greetings and art of conversation 6.3 Dressing and grooming 6.4 Ethical codes of conduct in business Intonation Pattern for effective presentation	8	L1, L2, L3
	Total Hours	**45**	

Books and References:

SN	Name of the Book	Name of the Author	Publisher	Edition	Year
1	Practical English Usage	Michael Swan	OUP	4th Edition	1995
2	Remedial English Grammar	F.T. Wood	Macmillan	2014 Edition	2007
3	Pocket Style Manual	Diane Hacker	Bedford publication, New York	2003 Edition (ISBN 0312406843)	2003
4	You Can Win	Shiv Khera	Macmillan Books, New York	2003 Edition	2003
5	Technical Writing & Professional Communication for non-native speakers of English	Thomas N. Huckin & Leslie A. Olsen	McGraw Hill Education	2011 Edition	2011
6	The 7 Habits of Highly Effective People	Stephen Covey	Free Press	2016 Edition	2016

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B. Tech. Artificial Intelligence and Machine Learning								**T.T. (SEM : V)**			
Course Name : Automata Theory								**Course Code :** PCC –AIML501			
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**						
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**						
Hours Per Week					**Theory (100)**			**Practical/Oral/ Presentation (25)**		**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**PR/OR**		**TW**	**125**
03	01	-	04	04	20	20	60	-	-	25	

ISE: In-Semester Examination - Paper Duration – 1 Hour
IE: Innovative Examination
ESE: End Semester Examination - Paper Duration - 2 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Discrete Structures and Graphs Theory (e.g. Graphs, Trees, Logic and Proof Techniques) and familiar with common Data Structures, Recursion, and the role of major system components such as Compilers.

Course Objectives:

This course aims to build concepts regarding the fundamental principles of Grammars, Automata Theory, Turing Machines, Push down Automata, Undesirability, and Intractable Problems

Course Outcomes: Upon completion of the course, student will be able to:

Sr. No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1.	Understand & Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.	L1,L2,L3,L4
2.	Understand Regular languages, Expression and Grammars and conversion from FA to RE and Vice versa	L1,L2,L3,L4
3.	Understanding Pumping Lemma concept and prove the weather language is regular or not.	L1,L2,L3,L4
4.	Understand, construct, analyze and interpret Context Free Grammar and Context Free languages and understand conversion process	L1,L2,L3,L4
5.	Design different types of Push down Automata as Simple Parser.	L1,L2,L3,L4,L5
6.	Design different types of Turing machine as a computing machine and also understand properties of Recursive and recursively enumerable languages	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Alphabets, Strings and Languages, automata and Grammars. Finite. Automata (FA) -its behavior; DFA -Formal definition, simplified notations (state transition diagram, transition table), Language of a DFA. NFA -Formal definition, Language of an NFA. An Application: Text Search, FA with epsilon-transitions, Eliminating epsilon-transitions, Equivalence of DFAs and NFAs.	**08**	L1,L2,L3,L4
2	**Regular Expression & Finite Automata** Regular expressions (RE) - Definition, FA and RE, RE to FA, FA to RE, algebraic laws for RE, applications of REs, Regular grammars and FA, FA for regular grammar, Regular grammar for FA, DFA Minimization Some decision properties of Regular languages -emptiness, finiteness, membership, equivalence of two DF As or REs, Finite automata with output. Regular Expression checking for both English and Hindi.	**08**	L1,L2,L3,L4
3	**Regular languages & Pumping Lemma** Proving languages to be non-regular - Pumping Lemma, and its applications. Some closure properties of Regular languages - Closure under Boolean operations, reversal, homomorphism, inverse homomorphism, etc. Myhill-Nerode Theorem.	**05**	L1,L2,L3,L4
4	**Context-free Grammar and Context Free Language** Formal definition, sentential forms, leftmost and rightmost derivations, the language of a CFG. Derivation tree or Parse tree- Definition, Relationship between parse trees and derivations. Parsing and ambiguity, Application of CFGs, Ambiguity in grammars and Languages. Simplification of CFGs - Removing useless symbols, epsilon-Productions, and unit productions, Normal forms - CNF and GNF. Proving that some languages are not context free - Pumping lemma for CFLs, applications. Some closure properties of CFLs - Closure under union, concatenation, Kleene closure, substitution,Context free Grammar checking for both English and Hindi.	**10**	L1,L2,L3,L4
5	**Pushdown Automata & Context Free Language** Formal definition, behavior and graphical notation, Instantaneous descriptions (Ids), The language of PDA (acceptance by final state and empty stack) . Equivalence of acceptance by final state and empty stack, Equivalence of PDAs and CFGs, CFG to PDA, PDA to CFG. DPDAs -Definition, DPDAs and Regular Languages, DPDAs	**07**	L1,L2,L3,L4,L5
6	**Turing Machines** Formal definition and behavior, Transitions (diagrams, Functions and Tables) Language of a TM,Design of TM as generator, decider and acceptor. , etc. Variants of TM: Nondeterministic, Multitrack, Multitape, Universal TM. Equivalence of Single and Multi Tape TMs, Power and Limitations of TMs,	**07**	L1,L2,L3,L4,L5,L6

	Design of Single and Multi Tape TMs for computer of simple functions: Unary, Binary (Logical and Arithmetic), String operations (Length, Concat, Match, Substring Check, etc)		
		Total Hours	**45**

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Introduction to languages and the Theory of Computation	J.C.Martin	Tata McGraw Hill	2nd	2009
2.	Theory of Computation A Problem Solving Approach	Kavi Mahesh	Wiley India	1st	2011
3.	Introduction to Automata Theory, Languages and Computation	John E. Hopcroft, Jeffrey D. Ullman	Pearson Education.	3rd	1979
4.	Theory of Computation	Vivek Kulkarni	Oxford University	1st	2013
5.	Theory of Computer Science, Automata Languages & Computations	N.Chandrashekhar& K.L.P. Mishra	PHI publications.	3rd	2006
6.	Introductory Theory of Computer Science	Krishnamurthy E.V	East-West press	2nd	2009

Online References:

Sr.No.	Website Name	URL	Modules covered
1.	https://www.tutorialspoint.com	hhttps://www.tutorialspoint.com/automata_theory/index.htm	M1 to M6
2.	https://www.javatpoint.com	https://www.javatpoint.com/automata-tutorial	M1 to M6
3.	http://www.infolab.stanford.edu	http://www.infolab.stanford.edu/~ullman/ialc.html	M1 to M6
4.	http://www.jflap.org/	http://www.jflap.org/	M1 to M6
5.	https://nptel.ac.in	https://nptel.ac.in/courses/111103016/	M1 to M6
6.	https://www.udemy.com	https://www.udemy.com/course/theory-of-automata/	M1 to M6

Topics for Practical/Tutorials:

Tut No.	Tutorials topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	Design a FSM for the given language	1	L1,L2,L3,L4
2	Construct DFA accepting the given language	1	L1,L2,L3,L4
3	Construct a non-deterministic finite automaton (NFA) for each of the given language And find equivalent DFA for given NFA.DFA Minimization problems from previous old university question papers	2	L1,L2,L3,L4
4	Design Moore & Mealy machine for given language ,Convert given Moore machine into Mealy machine & Convert following Mealy machine into Moore machine	1	L1,L2,L3,L4
5	Construct a regular expression (RegEx) for given language and describe the language of the RegEx as concisely as possible.	1	L1,L2,L3,L4
6	Write Context Free grammar for given problem statement convert CFG into CNF & GNF form Write derivations for given CFG	1	L1,L2,L3,L4
7	Design PDA for the given language	2	L1,L2,L3,L4,L5
8	Convert CFG into PDA & Vice versa.	2	L1,L2,L3,L4,L5
9	Design Turing Machines for the given language	2	L1,L2,L3,L4,L5,L6
10	Case study Experiment	2	L1,L2,L3,L4,L5,L6
	Total Hours	**15**	

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B. Tech. Artificial Intelligence and Machine Learning								**T.T. (SEM : V)**		
Course Name: Software Engineering with Devops								**Course Code :** PCC-AIML 502		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**					
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**					
Hours Per Week					**Theory (100)**			**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**OR**	**TW**	
3	-	2	5	4	20	20	60	25	25	**150**
ISE: In-Semester Examination - Paper Duration – 1 Hour **IE:** Innovative Examination **ESE**: End Semester Examination - Paper Duration - 2 Hours **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).										
Prerequisite: Programming, networking and Linux operating system										

Course Objective: This course will study a collection of methods which represent an "engineering" approach to the development of software. It will discuss the nature of software and software projects, software development models.

The course intends to deliver the fundamentals of Devops with software engineering concepts, Linux essential with cloud computing, building a source code and version control with tools, software testing automation, configuration and containerization in devops, Network monitoring tool.

Course Outcomes: Upon completion of the course, student will be able to:

Sr.No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Remember the importance of DevOps tools used in software development life cycle	L1, L2
2		L1,L2,L3,L4,L5
3	Understand the importance of Jenkins to Build, Deploy and Test Software Applications. Examine the different Version Control strategies	L2,L3,L4,L5
4	Describe and implement Software testing automation in devops using different tools.	L2,L3,L4, L5
5	Analyze& Illustrate the Containerization of OS images and deployment of applications over Docker	L2,L3,L4, L5
6	Synthesize the provisioning using Network Monitoring Tool-Nagios	L2,L3,L4, L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**The Software Process and Agile Software Development** Professional Software Development, Prescriptive Models : Waterfall Model, Incremental, 06 RAD Models Evolutionary Process Models: Prototyping, Spiral and Concurrent Development Model Specialized Models: Component based, Aspect Oriented development, Agile Process and Process Models, Adaptive and Development Dynamic system Development, Scrum.	**06**	L1, L2
2	**Modeling Practices Requirements Engineering** Core Principles, Communication, Planning, Modeling, 04 Modeling Construction and deployment. System Modeling and Practices UML, Requirements Engineering Tasks, Elicitation, Data Modeling concepts, Object Analysis Model Oriented Analysis	**08**	L1,L2,L3,L4,L5
3	**Design Engineering and Testing Strategies** Design Concepts, Design Model – Data, Architecture,Interface, Component Level and Deployment Level design elements, Testing strategies for conventional and Object Oriented, Validation and system testing Software testing fundamentals, Black box and white box testing, Object Oriented testing methods	**07**	L2,L3,L4,L5
4	**Source Code Management** Version Control: GIT Features, 3-Tree Architecture, GIT – Clone /Commit / Push, GIT Hub Projects, GIT Hub Management, GIT Rebase & Merge, GIT Stash, Reset, Checkout ,GIT Clone, Fetch, Pull,Membership GITHUB.	**09**	L2,L3,L4,L5
5	**Configuration Management in Devops** Introduction: What Is Devops, History of Devops, Devops definition, DevOps Main Objectives Configuration: Why Configuration Management?, What is Configuration Management?, The Process of Configuration, Configuration Management in DevOps, DevOps Starts and Ends with Configuration, Benefits and Risks, Configuration Management Tools Containerization: Container introduction, Docker introduction, Docker Image, Docker Installation, Working with Docker Containers, Docker Engine, Creating Containers with an Image, Working with Images, Docker Hub , Docker Trusted Registry , Docker File & Commands	**09**	L2,L3,L4,L5
6	**Devops Monitoring Tool** DevOps with monitoring tools: Introduction to Monitor routers, switches, firewalls, servers, and VMs for fault and performance, Real-time network monitoring using tools, Physical and virtual server monitoring, Threshold-based monitoring, Reactive network monitoring, Introduction to Nagios , Installation , Architecture.	**06**	L2,L3,L4,L5
	Total Hr.	**45**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Docker: Up and Running	Karl Matthias & Sean P. Kane	O'Reilly Publication	2nd	2018
2.	DevOps, A Software Architects Perspective	Len Bass,IngoWeber,Liming Zhu	Addison Wesley-Pearson Publication.	1st	2015
3.	Jenkins, The Definitive Guide	John Ferguson Smart	O'Reilly Publication	1st	2011
4.	DevOps for Dummies	Sanjeev Sharma and Bernie Coyne	Wiley Publication	3rd	2017
5.	DevOps for Developers	Httermann, Michael	Apress Publication	1st	2012
6.	Practical DevOps	Joakim Verona	Pack publication	1st	2016

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
1.	https://www.edx.org	https://www.edx.org/learn/devops	M1
2.	https://www.tutorialspoint.com/	https://www.tutorialspoint.com/listtutorial/DevOps-Tutorial-for-Beginners/9263	All
3	https://www.guru99.com/	https://www.guru99.com/devops-tutorial.html	All
4.	https://www.geeksforgeeks.org	https://www.geeksforgeeks.org/most-popular-devops-tools/	M1

List of Practical/ Experiment:

Practical No.	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	Basic experiment	Study experiment of Software Engineering fundamentals with Devops	2	L1, L2
2		Study experiment of Cloud Computing fundamentals	2	L3,L4,L5
3		Study Experiments of Linux essential commands	2	L3,L4,L5
4	Design Experiment	To Install and Configure Jenkins to test, and deploy Java or Web Applications using Netbeans or eclipse.	4	L5,L6
5		To Perform Version Control on website/ Software using different Version control tools	2	L3,L4,L5
6		To Install and Configure Docker for creating Containers of different Operating System Images	2	L3,L4,L5
7		To Install and Configure Docker for creating Containers of different Operating System Images	2	L3,L4,L5
8		To Build, deploy and manage web or Java application on Docker	2	L3,L4,L5

9		To install and configure Software Configuration Management Tool	4	L5,L6
10		To install and configure Network Monitoring Tool	4	L5,L6
11	**Group Activity/ Case study**	Case Study on importance of devops in software industry	4	L3,L4,L5
		Total Hrs.	**30**	

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.Tech. Artificial Intelligence and Machine Learning								**T.T. (SEM : V)**		
Course Name: Fundamentals of Machine learning								**Course Code:** PCC-AIML 503		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**					
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**					
Hours Per Week					**Theory (100)**			**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**PR**	**TW**	**150**
3	-	2	5	4	20	20	60	25	25	

ISE: In-Semester Examination - Paper Duration – 1 Hour
IE: Innovative Examination
ESE: End Semester Examination - Paper Duration - 2 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Knowledge of any programming language, Data structures, Basic probability and statistics
RBT : Revised Bloom's Taxonomy

Course Objective:
This course provides a broad introduction to machine learning, data mining, and statistical pattern recognition. Topics include: (i) supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building smart robots (perception, control), text understanding (web search, anti-spam), computer vision, medical informatics, audio, database mining, and other areas

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches	L1, L2
2	Provide understanding of the limitations of various supervised machine learning algorithms and the way to evaluate performance of machine learning algorithms.	L1, L2,L3
3	Use a tool to implement typical Regression algorithms for different types of applications	L1, L2,L3
4	To use a tool to implement typical clustering algorithms for different types of applications	L1, L2,L3,L4

5	Dimension Reduction Techniques and its significance for machine learning performance	L1, L2,L3,L4, L5,L6
6	Identify and apply Machine Learning algorithms to solve real world problems	L1, L2,L3,L4, L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Machine Learning** Introduction: What is Machine Learning History and overview of machine learning, Types of Machine Learning – Supervised, Unsupervised Semi-Supervised Learning and Reinforcement Learning Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability	8	L1, L2
2	**Supervised Learning –Classification** Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks -Feed-forward Network Functions - Error Back propagation - Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks. Ensemble methods- Bagging- Boosting.Linear model for classification on small database.	9	L1, L2,L3
3	**Supervised Learning –Regression** Regression: Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods, Principal Component Regression, Partial Least squares Regularized Regression - Ridge Regression and Lasso Assessing performance of Regression – Error measures, Overfitting and Underfitting, Catalysts for Overfitting, VC Dimensions,Linear regression on small database.	7	L1, L2,L3
4	**Unsupervised and Semi Supervised Learning** Distance based clustering Algorithms- K-means and K-medoids, Hierarchical clustering. Hierarchical Aglomerative Clustering. Density Based Scan Clustering (DBSCAN),Gaussian Clustering Model Semi-supervised learning with EM using labeled and unlabled data Clustering	7	L1, L2,L3,L4
	Dimensionality Reduction And Evolutionary Models		

5	Dimensionality Reduction – Subset Selection ,Linear Discriminate Analysis ,Principal Component Analysis ,Factor Analysis ,Independent Component Analysis , Locally Linear Embedding ,Isomap ,Least Squares Optimization, Evolutionary Learning -Genetic algorithms ,Genetic Offspring, Genetic Operators ,Using Genetic Algorithms Reinforcement Learning – Overview ,Getting Lost Example Markov Decision Process for small database.	7	L1, L2,L3,L4, L5,L6
6	**Machine Learning Applications** Speech Recognition, Image Retrieval, Credit card Fraud Analysis, Recommendation Systems and Collaborative filtering,SentimentAnalysis,Customer Segmentation and Value,Portfolio Risk Conformance	6	L1, L2,L3,L4, L5,L6
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1.	Machine Learning – An Algorithmic Perspective	Stephen Marsland	Chapman and Hall/CRC Machine Learning and Pattern Recognition Series	First	2014
2.	Machine Learning	Tom M Mitchell	McGraw Hill Education	First	2013
3.	Machine Learning	AnuradhaSrinisaragahven Vincy Joseph	Wiely	First	2017
4.	Machine Learning: The Art and Science of Algorithms that Make Sense of Data	Peter Flach	Cambridge University Press	First	2012
5.	Machine learning – Hands on for Developers and Technical Professionals	Jason Bell	Wiley	First	2014

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://nptel.ac.in	https://nptel.ac.in/courses/106/106/106106202/	M1,M2,M3,M4,M5,M6
2	Coursera.org	https://www.coursera.org/learn/machine-learning	M4,M5,M6
3	www.W3schools.com	https://www.w3schools.com/python/python_ml_getting_started.asp	M1,M2,M3,M4,M5,M6

List of Practical's / Experiments:

Practical No.	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	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.	2	L1,L2,L3
2		For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples	2	L1,L2,L3
3	**Design Experiments**	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	2	L1,L2,L3
4		Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.	2	L1,L2,L3,L6
5		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.	2	L1,L2,L3
6		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.	2	L1,L2,L3,L4
7		Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program	2	L1,L2,L3,L4,L5
8		Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem	2	L1,L2,L3
9		Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.	2	L1,L2,L3
10		Mini Project	2	L1,L2,L3,L4,L5,L6

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="9">B.Tech. Artificial Intelligence and Machine Learning</td><td colspan="4">T.T. (SEM : V)</td></tr>
<tr><td colspan="9">Course Name: Computer Graphics & Virtual Reality</td><td colspan="4">Course Code: PEC -AIML5011</td></tr>
<tr><td colspan="9">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="9">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="3">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>ISE</td><td>IE</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">150</td></tr>
<tr><td>3</td><td>-</td><td>2@</td><td>5</td><td>4</td><td>20</td><td>20</td><td>60</td><td>25</td><td>25</td></tr>
<tr><td colspan="10">ISE: In-Semester Examination - Paper Duration – 1 Hour
IE: Innovative Examination
ESE: End Semester Examination - Paper Duration - 2 Hours
@: Professional Elective Courses Lab will be conducted in the form Capstone Project
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
<tr><td colspan="10">Prerequisite: mathematics & any programming language
RBT : Revised Bloom’s Taxonomy</td></tr>
</table>

Course Objectives: The course intend to deliver the fundamentals of components of graphics system and apply 3-dimensional computer graphics to convert geometrical primitives, transform shapes, develop computer games, information visualization business applications and analyze the fundamentals of animation, virtual reality.

Course Outcomes: Upon completion of the course student will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom’s Taxonomy
1	Understand basic concepts used in computer graphics.	L1, L2
2	Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	L1, L2, L3
3	Implement & Describe the importance of viewing and projections.	L1, L2, L3,L4
4	Define the fundamentals of animation, virtual reality and its related technologies.	L1, L2, L3,L4
5	Understand a typical graphics pipeline.	L1, L2
6	Understand & explain Modeling& programming in VR	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Computer graphics and Output primitives1** Display Devices, Bitmap and Vector based graphics, Overview of Coordinate System. **Scan Conversion of:** point, line using Digital differential analyzer &Bresenham's algorithm, circle using midpoint approach, **Curve Generation:** Bezier and B-Spline curves. Introduction to fractals: generation procedure, classification, dimension and Koch Curve.	8	L1, L2
2	**Area Filling, Transformations (2D & 3D)** Area filling: Inside/Outside Test, Scan line Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm.Apply algorithms on Image Basic Geometrical 2D Transformations: Translation, Rotation, Scaling, Reflection, Shear, their homogeneous Matrix representation and Composite transformation. Three Dimensional transformations: Translation, Scaling, Rotations, Composite, Apply algorithms on Image.	8	L1, L2, L3
3	**Viewing (2D and 3D) Projection and Clipping** Viewing: Introduction, Viewing Pipeline, View Coordinate reference frame, Window to viewport transformation. Three-Dimensional Viewing: 3D Pipeline, Viewing transformation, Projections: Parallel (Oblique and orthographic), Perspective (one point) , Clipping: Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky algorithms, Polygon clipping: Sutherland Hodgeman polygon clipping and Weiler Atherton. Text Clipping	8	L1, L2, L3,L4
4	**Introduction to Animation** **Animation:** Key Frame Animation, Animation Sequence, Motion Control Methods, **Morphing, Warping**- Mesh Warping.Hardware and software requirement for animation.	5	L1, L2, L3,L4
	Introduction to Virtual Reality		

5	**Virtual Reality:** Basic Concepts, Overview and perspective on virtual reality, Human sensation and perception. Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces, Input Devices, Graphical Display, Sound displays, and Haptic Feedback. Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL rendering pipeline. Applications of Virtual Reality.	8	L1, L2
6	**VR Modeling and Programming** **Geometric Modeling:** Virtual Object Shape, Object Visual Appearance. **Kinematics Modeling:** Object Position, Transformation Invariants, Object Hierarchies, **Physical Modeling:** Collision Detection, Surface Deformation, Force Computation. **BehaviorModeling:** Programming through VRML/X3D: Defining and Using Nodes and Shapes, VRML Browsers, Java 3D, OpenCV for augmented reality	8	L1, L2
	Total Hours	**45**	

Books and References:

Sr.No.	Title	Authors	Publisher	Edition	Year
1	Computer Graphics	Donald Hearn and M. Pauline Baker	Pearson Education.	Second	2008
2	Computer Graphics with Virtual Reality	R. K Maurya	Wiley India	First	2009
3	Virtual Reality Technology	GrigoreBurdea, Philippe Coiffet	Wiley	Second	2005
4	Computer Graphics	Steven Harrington	McGraw Hill	First	2007
5	Procedural Elements of Computer Graphics	Rogers	Tata McGraw Hill	First	2001
6	Virtual Reality Systems	Vince	Pearson Education	First	2007
7	Computer Graphics using Open GL	F.S. Hill, Stephen M. Kelley	Prentice Hall	First	2007
8	Learning OpenCV 3 Application Development	SamyakDatta	Packt	First	2016

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com/computer_graphics/	http://ecomputernotes.com/computer-graphics/basic-of-computer-graphics/introduction-to-computer-graphics, https://www.tutorialspoint.com/computer_graphics/computer_graphics_basics.htm, https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/circle_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/computer_graphics_curves.htm	M1
2	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/2d_transformation.htm, https://www.tutorialspoint.com/computer_graphics/3d_transformation.htm	M2
3	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/viewing_and_clipping.htm	M3
4	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/computer_animation.htm	M4
5	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/, http://www.iamwire.com/2017/10/19-ways-on-how-to-get-the-most-from-virtual-reality/167724, https://www.realitytechnologies.com/virtual-reality/	M5
6	https://www.explainthatstuff.com/virtualreality.html	https://www.explainthatstuff.com/virtualreality.html http://what-when-how.com/Tutorial/topic-8032kh/Interactive-Web-Based-Virtual-Reality-with-Java-3D-22.html, https://www.whoishostingthis.com/resources/vrml/	M6

Capstone Project Hours Distribution:

Sr. No.	Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1.	Identification and Study of computer graphics commands & loading graphics driver on system, implementation of viewing and clipping.	4	L1,L2,L3
2.	Project Title Identification	2	L1,L2,L3
3.	Modelling or prototype design	2	L1,L2,L3
4.	Graphics Design	8	L1,L2,L3,L4,L5

5.	Implementation	8	L1,L2,L3,L4,L5
6.	Testing of Mini Project	2	L1,L2,L3,L4,L5
7.	Preparation of Report	4	L1,L2,L3,L4,L5
	Total Hours	**30**	

T.T. Semester –V

Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)

TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B.Tech. Artificial Intelligence and Machine Learning								**T.T. (SEM : V)**		
Course Name: Wireless network								**Course Code: :PEC -AIML5012**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**					
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**					
Hours Per Week					**Theory (100)**			**Practical/ Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**OR**	**TW**	
3	-	2@	5	4	20	20	60	25	25	**150**
ISE: In-Semester Examination - Paper Duration – 1 Hour **IE:** Innovative Examination **ESE**: End Semester Examination - Paper Duration - 2 Hours @: Professional Elective Courses Lab will be conducted in the form Capstone Project **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).										
Prerequisite: Computer networks, Wireless Network, Modulation and Demodulation Techniques, PSTN										

Course Objective: The course intends to deliver the fundamentals of wireless network, analyse different wireless Technologies, evaluate Ad- hoc networks and wireless sensor networks, analyse and evaluate the security threats and related Security standards and learn design considerations for wireless networks.

Course Outcomes: Upon completion of the course Students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Explain the basic concepts of wireless network and wireless generations.	L1,L2
2	Demonstrate the different wireless technologies such as CDMA, GSM, GPRS etc.	L1,L2
3	Appraise the importance of Ad-hoc networks such as MANET and VANET and Wireless Sensor networks	L1,L2,L3
4	Describe and judge the emerging wireless technologies standards such as WLL, WLAN, WPAN, WMAN	L1,L2,L3
5	Differentiate and support the security measures, standards. Services and layer wise security considerations	L1,L2,L3,L4
6	Explain the design considerations for deploying the wireless network infrastructure.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's
1	**Fundamentals Wireless Communication** Fundamentals of Wireless. Communication, Advantages limitations and application, wireless media, Infrared Modulation Techniques, DSSS and FHSS Frequency Spectrum: Radio and Infrared; Wireless generations: 1G: Cellular,2G: Mobile Radio,3G: UMTS- Security related Encryption Algorithm,4G	07	L1,L2,L3,L4
2	**Evolution of Wireless Technologies** Multiple Access Technique: TDMA, FDMA, CSMA, CDMA Wireless Technologies: GSM GPRS, EDGE,CDMA,LTE, UMTSX	08	L1,L2,L3,L4
3	**Types of Wireless Networks** Ad-hoc: MANET & VANET, Application, Advantage and limitations; Wireless Sensor Network: Application, advantages and limitations	08	L1,L2,L3,L4,L5,L6
4	**Emerging Wireless Technologies and standards** WLL , WLAN- 802.11 (Wi-Fi), WPAN- 802.15.1/3/4 (Bluetooth Zigbee), WMAN- 802.16a (Wi- max) , Wi-max and LTE /3GPP comparison,	08	L1,L2,L3,L4,L5,L6
5	**Wireless Network Security** The need, attacks, security serviced, WEP, Mobile IP, VPN(PPTP, LLTP, IPSec), Network Layer Security, Transport Layer Security Email Security: PGP, S/ MIME,	07	L1,L2,L3,L4,L5,L6
6	**Wireless Network Design Considerations** Wireless technology, Cisco Unified Wireless Network, Designing Wireless Networks with Lightweight Access Points and Wireless LAN Controllers	07	L1,L2,L3,L4,L5,L6
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Wireless Communications and networks	William Stallings	Pearson / Prentice Hall	3rd	2007
2	Wireless Communications	T.L.Singal,	TMH	2nd	2011
3	Authorized Self-Study Guide, Designing for Cisco Internetwork Solutions (DESGN)	Diane Teare.	Cisco Press	2nd	2003
4	Wireless communication and networking	Vijay Garg	Elsevier	2nd	2007

Online References:

Sr. No.	Website Name	URL	Modules covered
1.	http://ciscodocuments.blogspot.com	http://ciscodocuments.blogspot.com/2011/06/chapter-2-applying-methodology-to.html	M6
2	www.rfpage.com	https://www.rfpage.com/evolution-of-wireless-technologies-1g-to-5g-in-mobile-communication/	M2
3.	www.computernetworkingnotes.com	https://www.computernetworkingnotes.com/ccna-study-guide/types-of-wireless-network-explained-with-standards.html	M3
4.	www.link-labs.com	https://www.link-labs.com/blog/types-of-wireless-technology	M4
5.	www.tutorialspoint.com	https://www.tutorialspoint.com/network_security/network_security transport_layer.htm	M5
6.	http://www.ciscopress.com	http://www.itsolutions.pro/images/stories/docs/cisco.press.designing.for.cisco.internetwork.solutions.desgn.pdf	M6

Capstone Project Hours Distribution:

Title: A Case study of wireless integration into an Enterprise Network:

Sr. No.	Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	Identification and Study of different types of wireless networks as per IEEE standards applicable for end-to-end communication - (Parameters require -- Physical layer standard, maximum performance, Frequency range, Bandwidth, Technology compatibility, Backward compatibility)	2	L1, L2, L3
2	Project Title Identification as per literature survey	2	L1, L2, L3, L4
3	Finalize design requirements of wireless network suitable for enterprise network perspective --- Gathering the hardware, software requirements to deploy network etc.	4	L1, L2, L3, L4, L5
4	Selection of suitable Authentication, Privacy for suitable wireless network	2	L1, L2, L3, L4
5	Test the requirements of IEEE 802.11 network type ---Threats, Vulnerabilities, and Countermeasures	2	L1, L2, L3, L4
6	Test the Wireless network vulnerability assessments – Suitable tools, Features	4	L1, L2, L3, L4
7	Network Protocol Analyzer Tools - Netstumbler etc.	4	L1, L2, L3
8	Wireless Deployment Considerations	1	L1, L2, L3, L4
9	Wireless policy recommendation – Based on security policy, Risk assessment, Information classification, Network segregation, wireless access point security, wireless client, authentication, scalability, encryption etc.	3	L1, L2, L3, L4, L5, L6
10	Testing of Mini Project – Technical feasibility study to be carried out for effective operations	2	L1, L2, L3, L4, L5, L6
11	Preparation of Report	4	L1, L2, L3, L4, L5, L6
	Total Hours	**30**	

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B. Tech. Artificial Intelligence & Machine Learning								**T.T. (SEM : V)**		
Course Name : Human Machine Interaction								**Course Code :** PEC-AIML 5013		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**					
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**					
Hours Per Week					**Theory (100)**			**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**OR**	**TW**	
3	-	2@	5	4	20	20	60	25	25	**150**

ISE: In-Semester Examination - Paper Duration – 1 Hour
IE: Innovative Examination
ESE: End Semester Examination - Paper Duration - 2 Hours
@: Professional Elective Courses Lab will be conducted in the form Capstone Project
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Web Technologies; Software Engineering; Experience in designing interfaces for applications and web sites. Basic knowledge of designing tools and languages like HTML, Java, etc

Course Objective:

At the end of the course, students will be able to – 1. Learn the foundation of human machine interaction. 2. Understand the importance of human psychology in designing good interfaces. 3. Be aware of mobile interaction design and its usage in day – to – day activities. 4. Understand various design technologies to meet user requirements. 5. Encourage to indulge into research in Machine Interaction Design.

Course Outcomes: Upon completion of the course student will be able to:

Sr.No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Identify User Interface (UI) design principles.	L1, L2
2	Analysis of effective user friendly interfaces	L1,L2,L3,L4
3	Apply Interactive Design process in real world applications.	L1,L2,L,L4
4	Evaluate UI design and justify.	L1,L2,L3,L4
5	Create application for social and technical task.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**FOUNDATIONS OF HMI** The Human: History of User Interface Designing, I/O channels, Hardware, Software and Operating environments, The Psychopathology of everyday Things, Psychology of everyday actions. Reasoning and problem solving . The computer: Devices.	07	L1, L2
2	**DESIGN & SOFTWARE PROCESS** Mistakes performed while designing a computer system, Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds .Interactive Design	09	L1,L2,L3, L4
3	**GRAPHICAL USER INTERFACE** The graphical User Interface: Popularity of graphics, the concept of direct manipulation, graphical systems, Characteristics. Web user	07	L1,L2,L3,L4
4	**SCREEN DESIGNING:** Design goals , Screen planning and purpose, organizing screen elements, ordering of screen data and content , screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics.	09	L1,L2,L3,L4,L5
5	**INTERFACE DESIGN FOR MOBILE DEVICES** Mobile Ecosystem: Platforms, Application frameworks: Types of Mobile Applications: Widgets, Applications, Games, Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools	07	L1,L2,L3,L4,L5, L6
6	**INTERACTION STYLES AND COMMUNICATION** Windows: Characteristics, Components, Presentation styles, Types of Windows, Management, operations. Text messages: Words, Sentences, messages and text words, Text for web pages. Icons,	06	L1,L2,L3,L4,L5, L6
	Total Hours	**45**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Human Computer Interaction	Alan Dix, Janet Finlay, Gregory Abowd,	Pearson	3rd	2004
2.	The Essential Guide to User Interface Design	Wilbert O. Galitz	Wiley	--	--
3.	About Face3: Essentials of Interaction design	Alan Cooper, Robert Reimann, David Cronin.	Wiley	--	--
4.	Designing with the mind in mind‖,	Jeff Johnson	Morgan Kaufmann	--	--
5.	Design of everyday things	Donald A. Norman	Basic Books	Reprint edition	2002
6.	Mobile Design and Development	Brian Fling	O'Reilly Media Inc	First Edition	2009.
7.	Interaction Design:Beyond Human Computer Interaction	Rogers Sharp Preece	Wiley	--	--
8.	The Handbook of Human Machine Interaction	Guy A. Boy	Ashgae publishing Ltd	--	--
9.	Galitz's Human Machine Interaction	Kalbande,Kanade,Iyer	Wiley Publicatio	--	--

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
1.	https://nptel.ac.in	https://nptel.ac.in/courses/108/103/108103157/	M1
2.	http://www.digimat.in	http://www.digimat.in/nptel/courses/video/108105102/L63.html	M2
3.	https://www.youtube.com	https://www.youtube.com/watch?v=MFMvhLkDuGw	M3
4.	https://nptel.ac.in	https://nptel.ac.in/courses/108105102/	M4
5.	http://www.digimat.in	http://www.digimat.in/nptel/courses/video/108105102/L36.html	M5
6.	http://www.infocobuild.com	http://www.infocobuild.com/education/audio-video-courses/electronics/MicroprocessorsMicrocontrollers-IIT-Kharagpur/lecture-34.html	M6

Capstone Project Hours Distribution:

Sr. No.	Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1.	Survey for different IoT application using Raspberry pi/Arduino/Different User Interface designs	2	L1,L2,L3
2.	IoT/UI design Project Title Identification	2	L1,L2,L3
3.	Identify the hardware and software requirement for their mini project problem statement.	4	L1,L2,L3
4.	Prototype/Design your own circuit board using Raspberry pi/Arduino/UI interface design	4	L1,L2,L3
5.	Work with operating system and do coding/designing for input devices on board/UI Interface	6	L1,L2,L3,L4
6.	Create and interface using web to publish or remotely access the data on Internet	4	L1,L2,L3,L4
7.	Present work in various projects competition /paper presentation etc.	4	L1,L2,L3,L4,L5
8.	Testing of Mini Project	2	L1,L2,L3,L4,L5
9.	Reports Design & Preparation	2	L1,L2,L3,L4,L5
	Total Hours	**30**	

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="8">B. Tech. Artificial Intelligence and Machine Learning</td><td colspan="4">T.T. (SEM : V)</td></tr>
<tr><td colspan="8">Course Name: NO-SQL</td><td colspan="4">Course Code: PEC -AIML5014</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="7">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="7">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="3">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>ISE</td><td>IE</td><td>ESE</td><td>OR</td><td>TW</td><td rowspan="2">150</td></tr>
<tr><td>3</td><td>-</td><td>2@</td><td>5</td><td>4</td><td>20</td><td>20</td><td>60</td><td>25</td><td>25</td></tr>
<tr><td colspan="10">ISE: In-Semester Examination - Paper Duration – 1 Hour
IE: Innovative Examination
ESE: End Semester Examination - Paper Duration - 2 Hours
@: Professional Elective Courses Lab will be conducted in the form Capstone Project
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%)</td></tr>
<tr><td colspan="10">Prerequisite: Knowledge of programming language, Data structures, Data model, Database management system</td></tr>
</table>

Course Objective: The course intends to learn basics of NoSQL databases, architecture patterns, implementation of NoSQL database based on business requirements and also to Apply NoSQL data modeling from application specific queries, Use Atomic Aggregates and denormalization as data modelling techniques to optimize query processing

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Compare and Contrast NoSQL databases with each other and Relational Database Systems	L1 to L4
2	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune document-oriented NoSQL databases.	L1 to L4
3	Explain the detailed architecture; define objects, load data, query data and performance tune Column -oriented NoSQL databases.	L1 to L4
4	Demonstrate an understanding of the detailed architecture; define objects, load data, query data and performance tune Key-Value Pair and Graph NoSQL databases.	L1 to L4
5	Understand the concept and challenge of big data and how NoSQL provides different ways to handle it.	L1 to L6
6	Develop web application with NoSQL &Perform basic database administration tasks.	L1 to L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Overview, and History of NoSQL Databases, Database Features of NoSQL, Difference Between RDBMS and NoSQL, Benefits of NoSQL Databases NoSQL business drivers, NoSQL case studies, Keeping components simple to promote reuse, Using application tiers to simplify design, Speeding performance by strategic use of RAM,SSD and disk, Using consistent hashing to keep your cache current Comparing ACID and BASE , How to minimize downtime with database sharding, Brewer's CAP theorem	7	L1 to L4
2	**NoSQL data architecture patterns** NoSQL data Architecture patterns and its types: Key/Value stores, Graph stores, Column oriented stores and Document stores. Document stores using MongoDB, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.	7	L1 to L4
3	**Column-oriented NoSQL database** Column- oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use	7	L1 to L4
4	**NoSQL Key-Value database & Graph NoSQL databases** NoSQL Key/Value databases using Riak, Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets. Graph NoSQL databases using Neo4, NoSQL database development tools and programming languages, Graph Databases, What is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use	11	L1 to L4
5	**Using NoSQL to manage big data** Big data NoSQL solution, relationship between scalability and expressivity, Types of big data problems, Analyzing big data with a shared-nothing architecture, master-slave versus peer-to-peer models, Using MapReduce to transform your data over distributed systems, Different ways that NoSQL systems handle big data problems, Case study: event log processing with Apache Flume, computer-aided discovery of health care fraud	8	L1 to L6
6	**Developing Web Application with NOSQL and NOSQL Administration** Php and MongoDB, Python and MongoDB, Creating Blog Application with PHP, NoSQL Database Administration,Develop Web Applications.	5	L1 to L6
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Making sense of NOSQL	Daniel G. McCreary and Ann M. Kelly	Manning	1st	2013
2	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Sadalage, P. & Fowler	Pearson Education	1st	2012
3	A Guide to Modern Databases and the NoSQL Movement Edition	Redmond, E. &Wilson	MIT Press	1st	2014
4	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Sadalage, P. & Fowler	Pearson Education	1st	2012
5	MongoDB and PHP	Steve Francia	O'Reilly Media	1st	2012
6	Neo4j in Action	AleksaVukotic and Nicki Watt	Manning	1st	2012
7	NoSQL with MongoDB in 24 Hours	Sams	Pearson Education	1st	2014

Online References:

Sr. No.	Website Name	URL	Modules Covered
1.	https://nptel.ac.in	https://www.digimat.in/nptel/courses/video/106106156/L23.html	M1to M6
2.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/mongodb/index.htm	M2
3.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/cassandra/cassandra_introduction.htm	M3
4.	https://riak.com/	https://www.monitis.com/blog/an-overview-of-riak-an-open-source-nosql-database/	M4
5.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/neo4j/index.htm	M4
6.	https://livebook.manning.com	https://livebook.manning.com/book/making-sense-of-nosql/chapter-6/ https://medium.com/cracking-the-data-science-interview/an-introduction-to-big-data-nosql-96b882f35e50	M5
7.	https://www.javatpoint.com	https://www.javatpoint.com/nosql-databases https://www.simplilearn.com/introduction-to-nosql-databases-tutorial-video	M1to M6
8.	https://opensourceforu.com https://blog.trigent.com/ https://subscription.packtpub.com/	https://opensourceforu.com/2015/01/developing-applications-using-nosql-databases/ https://blog.trigent.com/managing-documents-in-java-web-application-using-nosql-database-and-http-apis https://subscription.packtpub.com/book/web_development/9781849513623	M6

Sr. No.	Work to be done	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1.	Identification and Study of NoSQL Database	8	L1,L2,L3
2.	Project Title Identification	2	L1,L2,L3
3.	Graphical User Interface Design	2	L1,L2,L3
4.	Database Design	2	L1,L2,L3
5.	Linking of GUI with Advanced Database	8	L1,L2,L3,L4
6.	Reports Design	2	L1,L2,L3
7.	Testing of Mini Project	2	L1,L2,L3,L4,L5
8.	Preparation of Report	4	L1,L2,L3,L4,L5
	Total Hours	**30**	

B.Tech. Artificial Intelligence and Machine Learning								T.T. (SEM : V)		
Course Name : Digital Signal & Image Processing								**Course Code :**PEC-AIML 5015		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**					
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**					
Hours Per Week					**Theory (100)**			**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**ISE**	**IE**	**ESE**	**PR**	**TW**	
3	-	2	5	4	20	20	60	25	25	150
ISE: In-Semester Examination - Paper Duration – 1 Hour **IE:** Innovative Examination **ESE**: End Semester Examination - Paper Duration - 2 Hours **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).										
Prerequisite: Engineering Mathematics										

Course Objective: Course should be able to describe the formation of digital images in a computer, calculate the transform and also the inverse transform of a given image, perform image enhancement in spatial and frequency domain, describe image restoration models and techniques, and describe texture. Description Methods

Course Outcomes: Upon completion of the course student will be able to:

Sr.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Demonstrate an understanding of basics of discrete time signal and system .	L1, L2
2	Perform exploratory analysis of Discrete Fourier transform	L1,L2,L3
3	Organize and Prepare the data needed for data mining using pre preprocessing techniques	L1,L2,L3
4	Learn image transform and image enhancement methods and apply it on given image	L1,L2,L3,L4,L5
5	Learn and implement image compression and image morphological technique	L1,L2,L3,L4,L5
6	Apply knowledge to solve practical problems in digital image processing domain.	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Discrete Time Signals & System:** Discrete–Time Signals representation and Manipulation, Discrete–Time IIR and FIR Systems, Impulse Response, Transfer Function, Difference Equation, Frequency Domain and Time Domain Analysis of IIR filter and FIR filter, Correlation, Linear and Circular and Covolution Algortithm,IP in PC and QC.	**07**	L1, L2
2	**Discrete Fourier Transform:** DTFT**,** Frequency Domain Sampling, Properties of DFT, DIT-FFT algorithm, Spectral Analysis using FFT, Linear FIR filtering using FFT based Overlap Save and Overlap Add Method	**07**	L1,L2,L3
3	**Image Transforms and Enhancement** Image Transforms **:**Introduction to Unitary Transform, DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Discrete Wavelet Transform for satellite images, Image Enhancement: Gray Level Transformations, Histogram Processing, Spatial Filtering: Introduction, Smoothing and Sharpening Filters. Colour Image Enhancement	**08**	L1,L2,L3,L4,L5
4	**Image Segmentation and Representation** Detection of Discontinuities, Laplacian of Gaussian, Derivative of Gaussain, Canny Edge Detection, Thresholding in Hierarchical Data Structures, Border Tracing, Edge linking and Boundary Detection, Thresholding, Region Based Segmentation. Representation Schemes for healthcare.	**08**	L1,L2,L3,L4,L5
5	**Image Data Compression and Image Morphology** Image Data Compression: Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Error Free Compression, Lossy Image Compression : Lossy Predictive Coding, JPEG, MPEG, Subband Coding using Wavelet Transform, Vector Quantization for WIFI Network Morphological Image Processing: Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Basic Morphological Algorithms on binary images	**09**	L1,L2,L3,L4,L5
6	**Applications of Image Processing** Case Study on Digital Watermarking, Biometric Authentication (Face, Finger Print, Signature Recognition), Vehicle Number Plate Detection and Recognition, Object Detection using Correlation Principle, Person Tracking using DWT, Handwritten and Printed Character Recognition, Contend Based Image Retrieval, Text Compression.	**06**	L1,L2,L3,L4,L5,L6
	Total Hr.	**45**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Introduction to Digital Signal Processing: Principles Algorithms Applications	J.G. Proakis	PHI	3rd	1996
2.	Digital Image Processing	R.C.GonsalesR.E.Woods	Pearson Education	3nd	2009
3.	Fundamentals of Image Processing	Anil K.Jain	PHI	2nd	2006

Online Recourses:

Sr. No.	Website Name	URL	Modules covered
1	https://tutorialpoints.com	https://www.tutorialspoint.com/digital_signal_processing/index.htm	M1,M2
2	https://tutorialpoints.com	https://www.tutorialspoint.com/dip/index.htm	M3,M4,M5,M6
3	htps://nptel.ac.in	https://nptel.ac.in/courses/117/102/117102060/	M1,M2
4	ttps://nptel.ac.in	https://nptel.ac.in/courses/117/105/117105079/	M3,M4,M5,M6

List of Practical/ Experiment:

actical No.	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic experiment**	Generating the following discrete time signals: a. Exponential signal b. Unit step and unit ramp signals c. Sinusoidal signal d. Composite signal with minimum 3 sinusoids added	2	L1, L2,L3
2		To find Linear Convolution, Circular Convolution And find output of Digital FIR filter using convolution principle..	2	L1, L2,L3
3	**Design Experiment**	To find output of real time signal using FFT based Overlap Add Method and Overlap Save Method	2	L1, L2,L3,L4,L5
4		To find DFT/FFT and DCT forward and Inverse Transform of Image.	2	L1, L2,L3,L4,L5
5		To find DWT and Walsh-Hadamard forward and Inverse Transform of Image.	2	L1,L2,L3,L4,L5
6		To enhance image using Histogram Equalization and Contrast Stretching	2	L1,L2,L3,L4,L5
7		To enhance image using Smoothing and Sharpening Filters	2	L1,L2,L3,L4,L5
8		To find edges using LOG and DOG and canny Edge Detection.	2	L1,L2,L3,L4,L5
9		To implement Image Border Tracing	2	L1,L2,L3,L4,L5
10	**Group Activity/ Case study**	Detailed case study of any one application of image processing	2	L1, L2,L3
11		DSIP Mini Project and paper presentation 1. Biometric Authentication 2. Object Detection 3. Image compression 4. Contend Based Image Retrieval	08	L1,L2,L3,L4,L5,L6
		Total Hrs.	**30**	

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

B. Tech. Artificial Intelligence & Machine Learning					**T.T. (SEM : V)**				
Course Name : Indian Constitution					**Course Code:** MC-AIML 501				
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory**		**Presentation(25)**	**Report(25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**AI**	**ESE**	**AC**	**AC**	**25**
1	-	-	1	Non Credit	-	-	-	25	

AC- Activity Evaluation

The weightage of marks for evaluation of Term work/ Report: Formative (40%), Timely completion of practical (40%) and Attendance/ Learning Attitude (20%)

Course Objective:

This course gives knowledge of Indian Constitution to students in order to ensure that the rules and regulations under which Central & State Govt function. Students would also be acquainted with various provisions, articles, important autonomous Govt bodies, Judiciary and the rights of every citizen of India. An engineer must have general idea of Constitution of India.-

Course Outcomes:

Upon completion of the course students will be able to:

Sr. No.	**Course outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Learn the salient features and importance of Indian Constitution	L1, L2
2	Understand the fundamental rights and duties	L1, L2
3	Learn about election methods and powers of Government of the Union	L1, L2
4	Learn about election methods and powers of Government of the State	L1, L2
5	Understand Indian Judiciary system	L1, L2
6	Understand about various Govt bodies and establishments of India	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Constitution – Structure and Principles** Meaning and importance of Constitution , : Making of Indian Constitution – Sources , Salient features of Indian Constitution	2	L1, L2
2	**Fundamental Rights and Directive Principles** Fundamental Rights, Fundamental Duties, Directive Principles, Union List& State List, Concurrent List	2	L1, L2
3	**Government of the Union** President of India – Election and Powers, Prime Minister and Council of Ministers , Lok Sabha – Composition and Powers ,Rajya Sabha – Composition and Powers	3	L1, L2
4	**Government of the States** Governor – Powers Chief Minister and Council of Ministers Legislative Assembly – Composition and powers Legislative Council – Composition and powers Local Govt&Panchayati Raj	3	L1, L2
5	**The Judiciary** Features of judicial system in India, : Supreme Court –Structure and jurisdiction , High Court – Structure and jurisdiction	2	L1, L2
6	**Administrative organization and constitution** Federalism in India – Features, Local Government-Panchayats–Powers and functions; 73rd and 74th amendments, Election Commission – Organization and functions , Comptroller & Auditor General of India (CAG), Attorney General of India& Advocate General of State, Central Vigilance Commission (CVC), Citizen oriented measures – RTI and PIL – Provisions and significance, UPSC & State PSC	3	L1, L2
	Total Hours	**15**	

Sr. No.	Title	Authors	Publisher	Edition	Year
1	India's Constitution	M.V.Pylee	New Delhi; S. Chand Pub	16	2017
2	Indian Polity	M Laxmikanth	McGraw Hill Chennai	05	2017
3	The Constitutional Law of India	J.N. Pandey	Allahabad; Central Law Agency	55	2018
4	Introduction to the Constitution of India	Durga Das Basu	Gurgaon; LexisNexis	23	2018

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	India.gov.in.	https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf	All

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="6">B.Tech. Artificial Intelligence and Machine Learning</td><td colspan="3">T.T. SEM: V</td></tr>
<tr><td colspan="6">Course Name: Summer Internship</td><td colspan="3">Course Code: SI-AIML501</td></tr>
<tr><td colspan="5" rowspan="2">Teaching scheme (Multidisciplinary and Holistic Education -HME) (Conducted in the beginning of Semester during first 3 Weeks)</td><td colspan="3">Assessment/Evaluation Scheme</td></tr>
<tr><td>Presentation</td><td>Report</td><td rowspan="2">TW</td></tr>
<tr><td>Theory</td><td>AC</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>160 * - 240*</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="8">AC- Activity evaluation TW – Term Work Examination
*This is part of Summer Internship but can start in winter. Students may go upto 240 hrs. to aquire maximum 6 credits in Semester 6

Total hrs. mentioned should be completed till end of Semester 6. Credits will be awarded at the end of 6th Semester and will be reflected in the Grade Card of 6th Semester.</td></tr>
<tr><td colspan="8">Prerequisite: Fundamental knowledge of Information Technology related tools</td></tr>
</table>

Course Objectives:
To get industry like exposure in the college laboratories by carrying out projects using subject studied till 4th semester. Also design innovative techniques / methods to develop the products. To gain knowledge of marketing and publicizing products developed.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To apply subjects knowledge in the college laboratories for carrying out projects	L1, L2,L3
2	Able to developed innovative techniques / methods to develop the products	L1, L2,L3
3	Able to do marketing and publicity of products developed	L1, L2,L3

Detailed Syllabus:

Module No.	Topics	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Program Specific Internship** Training and certification on emerging technologies in domains offered by Department of Computer Engineering Applying classroom and laboratory knowledge to design , develop and deploy the products	L1, L2, L3
2	**Inter disciplinary Internship** • To explore and understand issues and challenges in the other disciplines (EXTC, ELEX, MECH and CIVIL) • Design , develop and deploy cost effective products using multidisciplinary approach	L1, L2, L3
3	**Industry Specific Internship** • To explore and understand issues and challenges in industry • Developing solutions for industry specific problems • Design , develop and deploy products for startup and SMEs	L1, L2, L3
4	**Interpersonal Internship** • To develop interpersonal skills such as leadership, marketing ,publicity and corporate ethics and communication • To get competence in problem solving , presentation , negotiation skills	L1, L2, L3
5	**Social Internship** • Identify and study different real life issues in the society • Identify societal problems and provide engineering solutions to solve these problems	L1, L2, L3
6	**Academic Internship** • Study report preparation, preparation of presentations, copy table book preparation , business proposal and IPR • Capture aspirations & expectations through interviews of students. • Ways to connect research in technical institutes with industry. • Taking inputs from self, local stakeholders and global stake holders which will help to develop process with comparative and competitive study.	L1, L2, L3

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	The Ultimate Guide to Internships: 100 Steps to Get a Great Internship and Thrive in It (Ultimate Guides)	Eric Woodard	Allworth	I	2015

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://www.letsintern.com/	https://www.letsintern.com/internships/summer-internships	M1-M6
2	https://codegnan.com	https://codegnan.com/blog/benefits-of-internships-and-importance	M1-M6
3	https://www.honorsociety.org	https://www.honorsociety.org/articles?category=internships	M1-M6

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">B. Tech. Artificial Intelligence and Machine Learning</td><td colspan="3">T.T. (SEM: V)</td></tr>
<tr><td colspan="5">Course Name: Professional Skill (Advanced Python for Machine Learning)</td><td colspan="3">Course Code : HME - ssAIMLPS501</td></tr>
<tr><td colspan="5">Teaching scheme (Multidisciplinary and Holistic Education - MHE)
(Conducted in the beginning of Semester during first 3 Weeks)</td><td colspan="3">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="3">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td>- Presentation</td><td>Report</td><td>Total (TW)</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td><td rowspan="2">75</td></tr>
<tr><td>15</td><td>-</td><td>30</td><td>45</td><td>2</td><td>50</td><td>25</td></tr>
<tr><td colspan="8">AC- Activity Evaluation TW: Teamwork Evaluation
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
</table>

Course Objective: The course intends to deliver the advance python concept to create easy-to-use and easy-to-maintain modules and packages. This Course will help to manipulate data, build custom classes and functions, create lists, and write more elegant, optimized code.

Course Outcomes: Upon completion of the course students will be able to:

Sr.No.	Course Objectives	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study numpy and associated functions	L1, L2
2	Implement data Types , Advance Python Numbers, Advance Python Strings	L1, L2
3	Implement Decorators, Generators , Iterators and Collections	L1, L2, L3
4	Understand and implement various function of python libraries	L1, L2, L3
5	Handle the files using various methods	L1, L2, L3
6	Develop the understanding to manipulate the dataset using different technique.	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
01	**Introduction** Intro to NumPy, Creating arrays ,Using arrays and scalars, Indexing Arrays, Array Transposition, Universal Array Function, Array Processing Array Input and Output, Indexing in depth	02	L1, L2, L3
02	**Python Objects** Python Data Types , Advance Python Numbers, Advance Python Strings	02	L1, L2, L3,L4
03	**Advanced Python Modules** Decorators, Generators , Iterators and Collections, Advance Python Sets, Advance Python Dictionaries and Advance List	02	L1, L2, L3
04	**Introduction to Python Libraries** NumPy , Scipy , Scikit-learn, Pandas, Matplotlib	03	L1, L2, L3,L4
05	**Working with Data Processing Part- I** Reading and Writing Text Files, JSON with Python, HTML with Python ,Microsoft Excel files with Python	03	L1, L2, L3,L4
06	**Working with Data Processing Part- II** Get Dataset, Importing Libraries, Importing Data Set ,Missing Data, Categorization Data, Splitting Datasets Into Training Sets And Test Set, Features Scaling	03	L1, L2, L3,L4
	Total Hrs.	**15**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	The Complete reference Python	Martin Brown	McGraw- Hill	Second	2018
2	Advanced Python Programming	Dr. Gabriele Lanaro, Quan Nguyen	Packt Publishing	First	2019

Online References:

Sr. No.	Website Name	URL	Modules Covered
1	https://realpython.com	https://realpython.com/tutorials/advanced/	M1-M6
2	https://www.techbeamers.com	https://www.techbeamers.com/python-tutorial-step-by-step/	M1,M3, M6

List of Practical's/ Experiments:

Sr. No.	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	Code on Numpy Library with associated functions.	2	L1, L2, L3
2		Code on arrays and scalars	2	L1, L2, L3
3	**Design Experiments**	Code on Python Data Types , Advance Python Numbers	4	L1, L2, L3
4		Code on Advance Python Strings	4	L1, L2, L3
5		Code on Decorators, Generators , Iterators and Collections	4	L1, L2, L3
6	**Advanced Experiments**	Code to study NumPy , Scipy , Scikit-learn, Pandas, Matplotlib	2	L1, L2, L3 ,L4,L5
7		Code on Reading and Writing Text Files, Microsoft Excel files with Python	2	L1, L2, L3
8		Code for handling Missing Data, Categorization Data,Splitting Datasets Into Training Sets And Test Set, Features Scaling	4	L1, L2, L3 ,L4,L5
9	**Mini/Minor Projects/ Seminar/ Case Studies**	Mini Project	6	L1, L2, L3 ,L4,L5
		Total Hrs.	**30**	

T.T. Semester –V

Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="5">B.Tech.(Artificial Intelligence and Machine Learning)</td><td colspan="3">T.T. (SEM : V)</td></tr>
<tr><td colspan="5">Course Name: Project Based Learning-III</td><td colspan="3">Course Code:HME-AIMLPBL501</td></tr>
<tr><td colspan="5">Teaching Scheme (Multidisciplinary and Holistic Education - MHE)
(Conducted in the beginning of Semester during first 3 Weeks)</td><td colspan="3">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="3">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td>Presentation (25)</td><td>Report(25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td><td rowspan="2">25</td></tr>
<tr><td>-</td><td>-</td><td>30</td><td>30</td><td>1</td><td>25</td><td>-</td></tr>
<tr><td colspan="8">AC- Activity Evaluation
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
<tr><td colspan="8">Prerequisite: Computer Fundamentals & knowledge of Programming Languages
RBT : Revised Bloom’s Taxonomy</td></tr>
</table>

Course Objectives: This course is intended to develop projects thereby identifying &analyzing the basic realtime problems and study existing solutions and prepare literature survey. To apply the basic computing &mathematics fundamentals to solve problems and to apply fundamental concepts of Programming such as C/C++ and Java to solve basic real time problems.

Course Outcomes:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom’s Taxonomy
1	To identify &analyze the basic real time problems and prepare literature survey.	L1,L2,L3
2	Identify & apply appropriate technologies & programming constructs to solve problems.	L1,L2,L3
3	Presenting & Documenting results obtained.	L1,L2,L3,L4

Projects Listing:

Sr. No.	Project Title	Type of Project
1	Design a website for online shopping / Online banking / Online Reservation System	Application
2	Multiple contingency services application	Application
3	GST calculating website	Application
4	Book Benchers website	Application
5	Prediction of lifestyle disease	Application
6	Automated Canteen web application	Application
7	Accident prevention.	Application
8	Human Safety Application	Application
9	Prediction of employment	Application
10	Android app for university helpline	Application
11	Book review website	Application
12	Virtual Assistant	Application
13	Job Finder Application	Application
14	Google Ad Grants online marketing challenge	Application
15	Personal management assistant	Application
16	Common mobility application	Application
17	Mobile app for Sansad agars gram yojna	Application
18	Integrated system for HOC cell, placement cell and EDC cell on NBA perspective	Application
19	Student and faculty interaction outside the classroom	Application
20	Meals on Wheels	Application
21	Early Prediction of Lifestyle diseases	Core
22	Citizen Feedback on Maintenance of Road	Core
23	Sustainable tourism management	Core
24	Block-Chain Based Certificate Validation	Core
25	Department of empowerment with social disabilities	Core
26	Crowd sourcing model for preparing large question banks. (Ministry of HRD)	Core
27	Geotagging offline	Core
28	Virtual Visit to ICU	Core
29	IoT in healthcare	Core
30	Indian Railways on Google Earth	Core
31	Efficient, easy and integrated billing system	Inter Disciplinary
32	Improving appointment scheduling in hospitals	Inter Disciplinary
33	Identifying accident prone area for roads	Inter Disciplinary
34	Yoga healthcare management system	Interdisciplinary
35	IOT in agriculture	Interdisciplinary
36	Games on Road Safety	Research

37	Identifying potential breaking news based on social media chatter	Research
38	Development of TCET forum for students to solve doubts and to share information	Research
39	Design an intelligent algorithm leveraging big data/AI/machine learning techniques that can learn from user viewing behavior	Research
	End to end mapping of network to arrive at the expected time of delivery	Research
40	Image analysis and compression	Research
41	Knowledge Enhancement Platform	Research
42	App development using IOT	Research
43	Game Development	Research
44	Sentiment Analysis using Social Media responses	Research

T.T. Semester –V
Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education - (CBCGS-HME 2020)
TCET Autonomy Scheme (w.e.f. A.Y. 2020-21)

<table>
<tr><td colspan="6">B. Tech. Artificial Intelligence and Machine Learning</td><td colspan="3">T.T. (SEM : V)</td></tr>
<tr><td colspan="6">Course Name :Research Based Learning I</td><td colspan="3">Course Code :HME-AIMLRBL501</td></tr>
<tr><td colspan="6">Teaching Scheme (Multidisciplinary and Holistic Education -MHE)
(Conducted in the beginning of Semester during first 3 Weeks)</td><td colspan="3">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="6">Modes of Teaching / Learning / Weightage</td><td colspan="3">Assessment/Evaluation Scheme</td></tr>
<tr><td colspan="5">Hours Per Week</td><td>Presentation</td><td>Report</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>AC</td><td>AC</td><td rowspan="2">50</td></tr>
<tr><td>-</td><td>-</td><td>30</td><td>30</td><td>1</td><td>25</td><td>25</td></tr>
<tr><td colspan="9">Audit course evaluated by Teacher Guardian</td></tr>
<tr><td colspan="9">AC- Activity Evaluation
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).</td></tr>
<tr><td colspan="9">Prerequisite: Subject knowledge, Domain knowledge</td></tr>
</table>

Course Objectives: This course is focused to engage the learner in research by upgrading domain knowledge by participation in technical quiz and debate, critical thinking, innovative idea generation and technical writing.

Course Outcomes: Upon completion of the course students will be able to:

S.N.	Course Outcome	Cognitive level attainment as per revised Bloom Taxonomy
1	Upgrade the knowledge of latest technologies in their discipline in a competitive environment.	L1, L2
2	Create new idea for problem solving related to industry or societal issues.	L1, L2, L3
3	Understand research methodologies.	L1, L2, L3, L4
4	Students will be able to write a technical paper.	L1, L2, L3, L4, L5

Detailed Syllabus:

Module No.	Topics	Cognitive level attainment as per revised Bloom
1	**Technical Quiz and Technical Debate** I. Quiz competition on technical topics from different domains with 50 MCQ (Questions will vary according to department). II. Formation of 8 teams for four topics. 2 teams (For and Against) for topic I will debate first, and the other teams will be audience.	L1, L2
2	**Idea generation with design thinking aspects and related literature survey** I. Introduction to design thinking and its stages. II. Formation of groups, generation of an idea and conducting literature survey.	L1, L2, L3
3	**Proof of concept and validation of idea through survey** **Seminar on Research methodology** I. Validate the idea by conducting the survey (through Google docs, interviews or any other suitable method). II. Seminar on different research methods and procedures for designing and conducting scientific research.	L1, L2, L3,L4
4	**Paper writing skills (Seminar/workshop)** **Documentation of Selected Idea and its validation** I. Seminar or workshop on paper writing skills. II. Write a research paper on idea generated.	L1, L2, L3,L4,L5

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Writing Research Papers: A Complete Guide	James D. Lester	Longman	10th	2001
2.	Creativity in Product Innovation	Jacob Goldenberg	Cambridge University Press	Kindle	2002

Online References:

Sr. No.	Website Name	URL	Modules Covered
1.	https://www.geeksforgeeks.org	https://www.geeksforgeeks.org/tag/c-quiz-references/	M1
2.	Interaction Design Foundation: Design Thinking	https://www.interaction-design.org/literature/topics/design-thinking	M2
3.	Scribbr: How to write a research methodology.	https://www.scribbr.com/dissertation/methodology/	M3
4.	https://www.statpac.com	https://www.statpac.com/online-software-manual/Basic-Research-Concepts.htm	M4
5.	https://www.slideshare.net	https://www.slideshare.net/AsirJohnSamuel/1introduction-to-research-methodology?next_slideshow=1	M4