M.E. Semester –I

M.E. (Computer Engineering)							**M.E. SEM : I**		
Course Name : Applied Statistics & Exploratory Data Analytics							**Course Code :** PCC-CSME101		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration – **1.5 Hours** **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: Computer Basics, Procedural Programming Languages									

Course Objective: The objective of the course is to study various techniques for effective problem solving along with different Data Science Techniques and Paradigms in computer science, to illustrate the efficient ways of problem solving for any given problem.

Course Outcomes: Students should be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand the complexities of various Challenges in Data Science	Understand (U)
2	Apply and analyze the complexity and identify approach to apply various Data Science techniques	Analyse (AN)
3	Apply and analyze the complexity of Data Management and Analytics techniques in Data Science	Analyse (AN)
4	Understand, apply and analyze different Data Science algorithms	Analyse (AN)
5	Understand , Apply and demonstrate Data Visualization techniques	Apply (A)
6	Demonstrate Data Science Course learning with a case study	Analyse (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Data Science Key Concepts & Terminology** Introduction to core concepts and technologies: Introduction, Terminology, datascience process, data science toolkit, Types of data, Example applications.	5	Understand (U)
2	**Data Management and Pre-processing** Data collection and management: Introduction, Sources of data, Data collection andAPIs, Recent trends in various data collection and analysis techniques, Exploring and fixing data, Data storage and management, Using multiple data Sources	9	Evaluate (E)
3	**Exploratory Data Analytics and Key Statistical Techniques** Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Exploratory Data Analytics, Correlation, Regression, Testing of Hypothesis, One tail, and Two tails test Analyses of variance. Linear discriminant analysis (LDA), Logistic regression: Bayesian logistic regression,	8	Evaluate (E)
4	**Data Visualization** Data visualisation: Introduction, Types of data visualisation, Data forvisualisation: Data types, Data encodings, Retinal variables, Mapping variables toencodings, Visual encodings, Technologies for visualisation, Bokeh (Python)	8	Evaluate (E)
5	**Applications of Data Science** Applications of Data Science, Recommendation System, Predictive Analytics, Text Mining, Sentiment Analysis and Case studies	8	Create (C)
6	**Business Intelligence and Case Study of Data Science application** Business Intelligence: Introduction to Business Intelligence, Enhancing the data model, Data Analysis Expression (DAX),Case study on Retail Business.	7	Evaluate (E)
	Total Hours	**45**	

Reference Books:

1. Rachel Shutts and Cathy O'Neil, "Doing Data Science", O Reilly, Second Edition, 2014.
2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data,EMC Education Services, Second Edition, 2015.
3. Kieran Healy, 'Data Visualization – A Practical Introduction', Princeton Univ. Press, 2019.
4. Field Cady, 'The Data Science Handbook,Wiley, 2018.
5. Ralph Kimball & Margy Ross, 'Data Warehousing Toolkit- A complete guide to dimensional modelling', Wiley, Second Edition, 2002.

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name : Machine Learning							**Course Code :** PEC-CSME102		
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**	**IA**	**ESE**			**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Algorithms, DBMS									

Course objectives:

1. To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
2. To design and analyse various machine learning algorithms and techniques with a modern outlook focusing onrecent advances
3. Explore supervised and unsupervised learning paradigms of machine learning.
4. To explore Deep learning technique and various feature extraction strategies

Course outcomes: Students should be able to:

S.No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand the concepts of machine learning algorithms	Analyze (AN)
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.	Analyze (AN) Evaluate (E)
3	To mathematically analyse various machine learning approaches and paradigms	Create (C)
4	Extract features that can be used for a particular machine learning approach in various IOT applications.	Analyze (AN)
5	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.	Analyze (AN)
6	To mathematically analyse various machine learning approaches and paradigms	Analyze (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Supervised Learning (Regression/Classification):** Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive 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.	10	Analyze (AN)
2	**Unsupervised Learning:** Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models)	7	Evaluate (E)
3	Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)	6	Apply (A)
4	Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	9	Apply (A)
5	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	9	Apply (A)
6	Recent trends in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.	5	Evaluate (E)

Books and Reference:

SN	Title	Authors	Publisher	Edition	Year
1	Machine Learning In Action	Peter Harrington	DreamTech Press	1st	2012
2	Introduction to Machine Learning	EthemAlpaydın	MIT Press	4th	2020
3	Machine Learning	Tom M. Mitchell	McGraw Hill	Indian	1997
4	Machine Learning An AlgorithmicPerspective	Stephen Marsland	CRC Press	2nd	2011
5	Machine Learning — A Probabilistic Perspective	Kevin P. Murphy	MIT Press	1st	2012

Online References:

S. No.	Website Name	URL	Modules Covered
1	www.nptel.ac.in	https://nptel.ac.in/courses/106/106/106106139/	M1, M2, M3, M5
2	www.coursera.org	https://www.coursera.org/learn/machine-learning	M1, M2, M3, M5
3	www.coursera.org	https://www.udemy.com/course/machinelearning	M2-M6

List of Experiments:

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	Study of Python Libraries for ML application such as Pandas and Matplotlib	2	L1-L5
2		Python program to implement Simple Linear Regression	2	L1-L5
3	**Design Experiments**	Implementation of Multiple Linear Regression	2	L1-L5
4		Implementation of Decision tree	2	L1-L5
5		Implementation of k-nearest neighbours classification using python	2	L1-L5
6		Implementation of Logistic Regression	2	L1-L5
7		Implementation of K-Means Clustering	2	L1-L5
8		Implementation of PCA classifier	2	L1-L5
9		Implementation of Reinforcement Learning	4	L1-L5
10	**Capstone Projects**	• Loan Prediction • Housing Prices Prediction • Stock Price Prediction • Uber Data Analysis • Personality Prediction	10	L1, L2, L3, L4
	Total Hours		**30**	

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective I Big Data Analytics							**Course Code :** PEC-CSME1011		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Data Structure, Computer Architecture and Organization									

Course objectives:
1. Understand big data for business intelligence. Learn business case studies for big data analytics. Understand nosql big data management. Perform map-reduce analytics using Hadoop and related tools

Course outcomes: Students should be able to:

S.No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Describe big data and use cases from selected business domains	Apply(A)
2	Explain NoSQL big data management	Apply(A)
3	Install, configure, and run Hadoop and HDFS	Create(C)
4	Perform map-reduce analytics using Hadoop	Evaluate(E)
5	Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics.	Apply(A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.	8	Apply(A)
2	Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peerpeer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.	8	Apply(A)
3	Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures	9	Analyze (AN)
4	MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats	10	Analyze (AN)
5	Hbase, data model and implementations, Hbase clients, Hbase examples, praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration	7	Evaluate(E)
6	Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries	6	Evaluate(E)

Reference Books:

1.Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World ofPolyglot Persistence", Addison-Wesley Professional, 2012.
4. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
6. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
8. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
9. Alan Gates, "Programming Pig", O'Reilley, 2011.

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective I Distributed Systems							**Course Code :** PEC-CSME1012		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Computer Basics, Procedural Programming Languages									

Course objectives:

1. To introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems.

Course outcomes: Students should be able to:

SN	Course Outcomes	Cognitive levels as per blooms Taxonomy
1	Design trends in distributed systems.	Analyze (AN)
2	Apply network virtualization.	Apply (A)
3	Apply remote method invocation and objects	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Introduction:** Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts **Distributed Database Management System Architecture:** Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues	8	Apply(A)
2	**Distributed database design:** Alternative design strategies; Distributed design issues; Fragmentation; Data allocation **Semantics data control:** View management; Data security; Semantic Integrity Control **Query processing issues:** Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data	11	Apply(A)
3	**Distributed query optimization:** Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms **Transaction management:** The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models **Concurrency control:** Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management	11	Analyze (AN)
4	**Reliability:** Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols	8	Analyze (AN)
5	**Parallel database systems:** Parallel architectures; parallel query processing and optimization; load balancing	6	Evaluate(E)
6	**Advanced topics:** Mobile Databases, Distributed Object Management, Multi-databases	4	Apply(A)

Reference Books:

1. Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.
2. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective I Data Preparation and Analysis							**Course Code :** PEC-CSME1013		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite:									

Course objectives:

1. To prepare the data for analysis and develop meaningful Data Visualizations

Course outcomes: Students should be able to:

S.No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand the various types, sources and format of data	Understand(U)
2	Develop methods for cleaning the data and dealing with missing values	Evaluate (E)
3	Apply the various exploratory data analytics techniques like descriptive and comparative statistics.	Create (C)
4	Create visualizations for the processed and analyzed data.	Create (C)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Unit1: Data Gathering and Preparation: Data formats, parsing and transformation, Scalability and real-time issues	8	Understand(U)
2	Unit2: Data Cleaning: Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation	8	Apply(A)
3	Unit3: Exploratory Analysis: Descriptive and comparative statistics	8	Evaluate(E)
4	Unit4: Clustering and association, Hypothesis generation	8	Evaluate(E)
5	Unit 5: Visualization: Designing visualizations, Time series, Geolocated data	8	Create(C)
6	Unit 6: Correlations and connections, Hierarchies and networks, interactivity	8	Create(C)

Reference Books:

1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by GlennJ. Myatt

M.E. Semester –I

M.E. (Computer Engineering)							**S.E. SEM : I**		
Course Name: Professional Elective I Applied Natural Language Processing							**Course Code :**PEC-CSME1014		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-		3	3	25	75		25	
IA: In-Semester Assessment - Paper Duration – 1.5 Hours **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: Programming Language Basic, Compiler Concepts									

Course Objective: Course should be able to deliver fundamental and applied knowledge of Natural Language Processing and applying knowledge to implement real time problems in various sectors. **Course Outcomes: Upon completion of the course students will be able to:**

SN	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**	**PO**	**PSO**	**PI**	**Module wise % weightage in exam**
1	Understand fundamental concepts and techniques of natural language processing.	L1, L2,L3	1-6,11	1-3	1.3.1	20%
2	Apply various text processing and analysis techniques in NLP	L1, L2, L3	1-6, 9-12	1-3	2.1.3	10%
3	Analyze the different statistical techniques in NLP	L1, L2, L3, L4	1-6, 9-12	1-4	3.1.1	20%
4	Analyze the different word level and sentence level analysis techniques in NLP	L1, L2, L3, L4	1-6, 9-12	1-4	3.1.1	20%
5	Understand concepts of transformers in NLP	L1, L2	1-6, 9-12	1-3	1.3.1	10%
6	Apply NLP techniques to design real world NLP applications in various sectors	L1, L2,L3	1-6, 11	1-3	2.1.3	20%

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Natural Language Processing(NLP)** Introduction, Terminologies , Phases, challenges of NLP , Generic Architecture of NLP , Applications of NLP, NLP tools and packages	5	L1, L2,L3
2	**Texts Processing and analysis in Natural Language Processing** Tokenization, Stop word Removal, Stemming , Lemmatization, Positional Encoding, Padding, Masking, Part-Of-Speech tagging , Name Entity Recognition, Word Cloud , Topic modeling, finite state transducers , N-gram language model, Bag of words ,Term Frequency—Inverse Document Frequency(TF-IDF), Text Clustering and Classification	6	L1, L2, L3
3	**Statistical methods of NLP** Finite state transducers, Hidden Markov Model (HMM), Neural Network, Conditional Random Field (CRF), Maximum Entropy, Natural Language Models(RNN, LSTM)	8	L1, L2, L3,L4
4	**Word level and Sentence level Analysis using NLP** Inflectional morphology & Derivational morphology, Regular expression, finite automata, lexemes & their senses, Word Net, Robust Word Sense Disambiguation (WSD)	8	L1, L2, L3,L4
5	**Transformers** Overview of Encoder-Decoder Architecture, Parts of Encoder-Decoder, Preprocessing Overview (Tokenization, Padding, Positional Encoding, Masking), Attention Mechanism, Similarities and Differences of Encoder and Decoder, Applications of Encoder-Only Model (word classification - BERT), Applications of Decoder-Only Model (Chatbot : Chat-GPT), Application of Encoder-Decoder Model (Language Translation)	10	L1, L2,L3,L4
6	**Applications of NLP across the Industries** Applications in Business, Healthcare, Education, Finance, Marketing, Human Resource, Retail and E-Commerce ,Telecom Industries, Cyber Security, Manufacturing and Transportation	8	L1, L2,L3,L4
	Total Hours	**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Applied Natural Language Processing in the Enterprise	Ankur A. Patel, Ajay , Uppili Arasanipalai	O'Reilly	Second	2021
2	Speech and Language Processing	Daniel Jurafsky, James H. Martin	Prentice Hall	Third Edition	2008
3	Foundations of Statistical Natural Language Processing	Christopher D.Manning and Hinrich Schutze,	MIT Press, 1999	Second Edition	1999
4	Natural Language Processing and Information Retrieval	Siddiqui and Tiwary U.S	, Oxford Univers ity Press	--	2008

Online Resources:

S. No.	Website Name	URL	Modules Covered
1	www.geeksforgeeks.org	https://www.geeksforgeeks.org/fundamentals-of-algorithms/#AnalysisofAlgorithms	M1-M6
2	www.tutorialspoint.com	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm	M1-M3, M6
3	www.w3schools.in	https://www.w3schools.in/category/data-structures-tutorial/	M1,M4

M.E. Semester –I

M.E. (Computer Engineering)								**B.Tech. SEM:** I		
Course Name: Professional Elective I Conversational AI								**Course Code:** PEC-CSME1015		
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**			
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										
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 mathematics concepts for software implementation or System, Statistics, Linear Algebra, Matrix, Calculus, probability, Programming Languages and Data Modelling.										

Course Objective: The main learning objectives of the course are to: Identify problems where artificial intelligence techniques are applicable. Apply selected basic AI techniques; judge applicability of more advanced techniques. Participate in the design of systems that act intelligently and learn from experience. Fundamentally, AI systems perceive environments, recognize objects, contribute to decision making, solve complex problems, learn from past experiences, and imitate patterns.

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	In-depth understanding of Conversational AI and its popular models.	L1, L2, L3
2	Detailed knowledge of GPT models, Diffusion models, different NLP transformers and ChatGPT	L1, L2, L3
3	Hands-on knowledge of implementing Conversational AI models in real-world applications.	L1, L2, L3
4	Knowledge about how possible for machines to learn from experience, adjust to new inputs and perform human-like tasks.	L1, L2, L3,L4
5	Detail knowledge of machine learning models to generate new text based on patterns learned from existing text data.	L1, L2, L3,L4
6	Detail understanding of Automating the manual process of writing content.	L1, L2, L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive level attainment as per revised Bloom Taxonomy
1.0	**Introduction to Generative Artificial Intelligence** Basic definition, Evolution & Concept of GAI, Technology of GAI, Types of GAI, Conversational AI vs AI, Discriminative AI vs Conversational AI, Generative Adversarial Network, Training method, Use Cases of GAI, Ethics and Bias in AI,	8	L1, L2, L3
2.0	**Discriminative AI** Discriminative AI, Various Machine learning Techniques, Classification, Regression, Clustering, Dimension Reduction, Reinforcement Learning, Data Transform. Broad Estimation Field: Text2image, 3-D object Generation, High resolution image generation, Human Pose Estimation, Video Generation, Synthetic Data Generation	8	L1, L2, L3
3.0	**Generative Adversarial Networks** Supervised & Unsupervised Learning, Discriminator role in Neural Network, Generative Algorithm Network, GAN Training method, Conversational AI: core algorithms and their evolution, VAEs - Variational Autoencoders, GANs - Generative Adversarial Networks, LLMs - Large Language Models	8	L1, L2, L3
4.0	**AI Image Generation** Stable Diffusion, Stable Diffusion walkthrough, image to image generation, Inpainting & out painting, Introduction to DALLE-2,	8	L1, L2, L3
5.0	**AI Text Generation** Introduction to ChatGPT, walkthrough ChatGPT, Prompt Engineering, AI Content Detection, Googles BARD & Potential, Microsoft's GPT-4 Powered Bing, New Bing Chat, New Bing Chat Walkthrough, HYPER-REALISM Generations	8	L1, L2, L3
6.0	**Deep Application GAI** Avatars, steps- setting image set, Training- resizing image Process, Google Collab, Pre training Steps, Model Training, Post training Steps, setting Avatar Model , generating audio using AI, Music by Google: Generating Music using AI, Speech to Text, Text to Video	5	L1, L2, L3
	Total Hours	**45**	

Books and References:

SN	Name of the Book	Name of the Author	Publisher	Edition	Year
1	Philosophy and Theory of Artificial Intelligence	Tijn Zant, Matthijs Kouw, Lambert Schomake	Springer	2nd Edition	2013
2	Conversational AI with Python and TensorFlow2	Joseph Babcock, Raghav Bali	Packt Publishing Limited	2021 Edition	2021
3	Generative Adversarial Networks for Image Generation	Xudong Mao, Qing Li	Springer, Nature	1st Edition	1992
4	Getting Started with Conversational AI: A short instructional guide written by AI	AI	--	Kindle Edition	2023
5	Rise of Conversational AI and ChatGPT	Utpal Chakraborty, Soumyadeep Roy, Sumit Kumar ·	BPB Publications	2023 Edition	2023
6	Generative Adversarial Networks for Image Generation	Xudong Mao, Qing Li	Springer Nature Singapore	2021 edition	2021

M.E. Semester –I

M.E. (Computer Engineering)								**B.Tech. SEM:** I		
Course Name: Professional Elective I Reinforcement Learning								**Course Code:** PEC-CSME1016		
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**			**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										
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)										
Prerequisite- Derivatives and Understanding Matrix Vector Operations, Notation, Probabilities, Gaussian Distributions, Mean, Standard Deviation, etc.										

Course Objective: In this course, we will explore how an agent (via interactions with the environment) can learn by trial and error. This is quite different from supervised machine learning and comes close to how humans learn by interactions. Reinforcement Learning (RL) deals with problems that require sequential decision making. This technology will explore the foundations of reinforcement learning. We will study different algorithms for RL and later in the course, we will explore how functional approximation in RL algorithms could be done using neural networks giving rise to deep reinforcement learning.

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

Sr. No.	Course Outcomes	Cognitive level attainmentas per revised Bloom Taxonomy
1	Learn how to define RL tasks and the core principals behind the RL, including policies, value functions, deriving Bellman equations	L1, L2, L3
2	Implement in code common algorithms following code standards and librariesused in RL	L1, L2, L3
3	Understand and work with tabular methods to solve classical control problems	L1, L2, L3
4	Generative architectures work, in great depth, from GANs to multimodal A.I,understanding every little detail in the process	L1, L2, L3,L4
5	In-depth review of the key concepts related to these architecture	L1, L2, L3,L4
6	Learn to use industry-leading tools for text, image, audio & video generation	L1, L2, L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive level attainment as per revised Bloom Taxonomy
1.0	**Introduction to Reinforcement Learning**	8	L1, L2, L3
	Introduction: Reinforcement learning, Elements of Reinforcement learning, Early history of Reinforcement Learning, Characteristics of Reinforcement Learning, Limitation & Scope, Tic-Tac -Toe, inside RL Agent, Reinforcement Learning Problems, Agent & Environment, Sequentially Decision Making, Policy		
2.0	**Probability Primer**	8	L1, L2, L3
	Brush up of Probability concepts - Axioms of probability, concepts of random variables, PMF, PDFs, CDFs, Expectation. Concepts of joint and multiple random variables, joint, conditional and marginal distributions. Correlation and independence.		
3.0	**Prediction and Control by Dynamic Programing**	8	L1, L2, L3
	Overview of dynamic programing for MDP, definition and formulation of planning in MDPs, Principle of optimality, iterative policy evaluation, policy iteration, value iteration, Banach fixed point theorem, proof of contraction mapping property of Bellman expectation and optimality operators, proof of convergence of policy evaluation and value iteration algorithms, DP extensions.		
4.0	**Monte Carlo Methods for Model Free Prediction and Control**	8	L1, L2, L3
	Overview of Monte Carlo methods for model free RL, Firstvisit and every visit Monte Carlo, Monte Carlo control, On policy and off policy learning, Importance sampling.		
5.0	**TD Methods**	8	L1, L2, L3
	Introduction, Definition and types, Limitations, Various phases of modeling, Monte Carlo method, Applications, advantages and limitations of simulation		
6.0	**Function Approximation Methods**	5	L1, L2, L3
	Getting started with the function approximation methods, Revisiting risk minimization, gradient descent from Machine Learning, Gradient MC and Semi-gradient TD(0) algorithms, Eligibility trace for function approximation, Afterstates, Control with function approximation, Least squares, Experience replay in deep Q-Networks.		
	Total Hours	**45**	

Books and References:

SN	Name of the Book	Name of the Author	Publisher	Edition	Year
1	Reinforcement Learning: An Introduction	Richard S. Sutton and Andrew G. Barto	MIT Press, 2020.	2nd Edition	2020
2	Reinforcement Learning and Optimal Control	Dimitri P. Bertsekas	Athena Scientific, 2019.	1st Edition Edition	2019
3	Reinforcement Learning: A Survey	Leslie Pack Kael bling, Michael L. Littman and Andrew W. Moore	Journal of Artificial Intelligence Research	4th Volume	1996
4	Reinforcement Learning: An Introduction	K. Deb	Prentice-Hall of India Pvt. Ltd., New Delhi	2003 Edition	2003

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective I Web Development 1-Front End Development							**Course Code :** PEC-CSME1017		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment- Paper Duration –**1.5 Hours** **ESE:**End Semester Examination- Paper Duration - **3 Hours**									
Prerequisite: Web Technologies, Software Engineering									

Course objectives:

The course intends to deliver fundamental knowledge about UI design guidelines and apply the knowledge to design intuitive UI for real life applications.

Course outcomes: Students should be able to:

S.No.	Course Outcomes
1	To design user centric interfaces.
2	To estimate the goal directed design.
3	To estimate the benefits of good GUI.
4	To summarize existing interface designs, and improve them based on existing design guidelines.
5	To apply new interactive style to design application for social and technical task.
6	To synthesize interactive communication while creating user interface.

Detailed Syllabus:

Module No.	Topics	Hrs.
1	**Web Design Principles** Basic principles involved in developing a web site, Planning process, rules of web designing aviation bar, Page design, Home Page Layout, Design Concept, Brief History of Internet, what is World Wide Web, Why create a website, Web Standards	8
2	**Introduction to HTML** What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Markup Tags, Heading-Paragraphs, Line Breaks, Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames,	8
3	**Introduction to Cascading Style Sheets** Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text	8
4	**Java Script** Java script Basics, Java script Events, Java script conditions and loop control structures, Alert, Prompt and Confirm statements, Java script validation	7
5	**Introduction to Web Publishing or Hosting** Creating the Web Site, Saving the site, working on the website, Creating web site structure, Themes-Publishing web sites.	7
6	**Introduction to Bootstrap** History, Fundamentals of Bootstrap, Bootstrap Grid System, Bootstrap Form and Form Components, Introduction JQuery, Element Selector, Document ready function,	7
	Total Hours	**45**

Reference Books:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	HTML 5 in simple steps	Kogent Learning Solutions Inc.	Dreamtech Press	1st Edition	2010
2	Creating a Web Page and Web Site	Murray,Tom/Lynchburg	For Dummies	1st Edition	2017
3	HTML, XHTML, and CSS Bible, 5ed	Steven M. Schafer	Wiley	5th Edition	2010

Lis of Practical:

Sr. No	Work to be done	No. of Hours
1	Introduction to HTML Tags	2
2	Advance HTML tags	2
3	Create Static Website by using all HTML Tags.	2
4	Introduction to Internal CSS	2
5	Introduction to External CSS	2
6	HTML Form tags(Elements, Attributes, properties, etc)	2
7	Introduction to JAVA Script(Programming basics)	2
8	Advance JAVA Script programming basics(Alert, Confirm, prompt) and Validations	2
9	Create 3 Web page using Bootstrap framework use bootstrap table, image and form elements etc.	2
10	Create the web page using Jquery effects, events on different elements	2
	Total Hours	**20**

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective I Software Engineering							**Course Code :** PEC-CSME1018		
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**	**IA**	**ESE**			**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Object Oriented Programming, Frontend Backend connectivity									

Course objectives:

The objective of the course is to introduce to the students about the development of software product, the processes that provides a framework for the engineering methodologies and practices. Also to give the information regarding the phases including the analysis, design, testing methodologies and quality assurance.

Course outcomes: Students should be able to:

SN	Course Outcomes	RBT level
1	Understand the use of basic and advanced models in software Engineering.	L1, L2
2	Understand and apply the scenarios to design the UML diagrams.	L1, L2, L3
3	Understand and apply the different techniques of project estimation an understand the tracking methods.	L1, L2, L3
4	Identify the design concepts and apply them to the project.	L1, L2, L3, L4
5	Identify and estimate risks, manage the change to assure quality in software project.	L1, L2, L3, L4, L5
6	Apply the principles of testing and develop test plan for the project.	L1, L2, L3, L4, L5, L6

Detailed Syllabus:

Module No.	Topics	Hrs.	RBT Levels
1.0	**Introduction** Introduction to software engineering, Importance of Software engineering Software Process, Various models for Software Development (Waterfall, Spiral, Agile (Scrum), V-Model, RAD, DevOps), Capability Maturity Model (CMM).	6	L1, L2
2.0	**Requirements Analysis and Modelling** Requirement Elicitation, Software requirement specification (SRS), Data Flow Diagram (DFD), Feasibility Analysis, Cost- Benefit Analysis, Developing Use Cases (UML), Requirement Model – Scenario-based model, Class-based model, Behavioural model.	8	L1, L2, L3
3.0	**Project Scheduling and Tracking** Software Project Estimation: LOC, FP, **Software Project Scheduling Principles**, Empirical Estimation Models - **COCOMO**, COCOMO II Model, Estimation for agile: planning poker, user story planning, **Benefits of Agile Estimation**, Project scheduling: Timeline charts, CPM, Fish-bone diagram	4	L1, L2, L3
4.0	**Software Design** Design Concepts, Characteristics of Good Design, Effective Modular Design – Cohesion and Coupling. Architectural Styles, UI Design.	8	L1, L2, L3,L4
5.0	**Software Risk, Configuration Management & Quality Assurance** Risk Identification, Risk Assessment, Risk Projection, RMMM, Software Configuration management, Software Quality Assurance: Software Reliability, Formal Technical Review (FTR), Walk-through, Quality Assurance Standards.	8	L1, L2, L3, L4,L5
6.0	**Software Testing and Maintenance** Software Testing, Unit testing, Integration testing Verification, Validation Testing, System Testing, Test plan, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Software maintenance and its types, Software Re-engineering, Reverse Engineering, Case Study on Artificial Intelligence and Computer Networks and Security, Real Time Applications of Software Engineering.	11	L1, L2, L3, L4,L5,L6
	Total Hours	**45**	

Books and References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	Software Engineering: A Practitioner ‘sApproach	Roger Pressman	McGraw-Hill Publications	6th Edition	2009
2	Software Engineering	Ian Sommerville	Pearson Education	9th edition	2017
3	Software Engineering Fundamentals	Ali Behfrooz and Fredeick J.Hudson	Oxford University Press	1st edition	1997
4	Software Engineering – Concepts and	Ugrasen Suman	Cengage Learning	1st edition	2012
5	An integrated approach to Software Engineering	Pankaj Jalote	Springer/Narosa	1st edition	2012

List of Practical/ Experiments:

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	Apply the knowledge of SRS andprepare Software Requirement Specification(SRS) document in IEEE format for theproject	2	L1, L2, L3
2		Sketch a DFD (up to 2 levels)	2	L1, L2, L3
3	**Design Experiments**	Sketch UML Use case Diagram for theproject.	2	L1, L2, L3
4		Sketch a Class Diagram for the project.	4	L1, L2, L3
5		Sketch Activity, State Transitiondiagram for the project.	4	L1, L2, L3
6		Sketch Sequence and Collaborationdiagram for the project	4	L1, L2, L3
7		Use project management tool toprepare schedule for the project.	2	L1, L2, L3
8		Change specification and use any SCMTool to make different versions	2	L1, L2, L3
9		Design test cases and generate testscripts in Selenium	4	L1, L2, L3,L4,L5
10	**Mini/Minor Projects/Seminar/ Case Studies**	**Mini Project:** 1. Online banking system 2. Online hotel managementsystem 3. Online sales Order Processingand Invoicing 4. Design Online BillManagement System	4	L1, L2, L3, L4,L5,L6
		Total Hours	**30**	

M.E. Semester –I

<table>
<tr><td colspan="8">M.E. (Computer Engineering)</td><td colspan="3">SEM: I</td></tr>
<tr><td colspan="8">Course Name: Professional Elective II
Basics of Data Science</td><td colspan="3">Course Code: PEC- CSME1021</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="6">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="6">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>PR/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="11">ISE: In-Semester Examination - Paper Duration – 1 Hours
IE: Innovative Examination</td></tr>
<tr><td colspan="11">ESE: End Semester Examination - Paper Duration - 2 Hours</td></tr>
<tr><td colspan="11">The 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="11">Prerequisite: Data Structures, Programming Languages, basic linear algebra, basic probability and statistics.</td></tr>
</table>

Course Objective: The objective of the course is to develop an understanding of how the nature of the data collection, the data itself, and the analysis processes relate to the kinds of inferences that can be drawn, Understand thelimitations of data sets based on their contents and provenance, Knowledge of what statistical analysis techniques to choose, to visualize Data and Perform Exploratory Data Analysis and to expose many different applications of the datascience approach.

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	Understand the concept of Data Science and its related terminologies	L1, L2, L3,L4
2	Understand and apply EDA using Python programming	L1, L2, L3
3	Analyze and apply Supervised and Unsupervised Machine Learning algorithms	L1, L2, L3, L4
4	Analyze and apply Feature Selection Techniques using Python programming	L1, L2, L3
5	Understand, Apply and Demonstrate different tools for Data Visualization	L1, L2, L3, L4
6	Analyze different case studies on Applications of Data Science to solve real-world problems	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Introduction: Data Science History, Increasing attention to Data Science, Data Science and Related Terminologies, Types of Analytics, Applications of Data Science, Data Science Process Models	6	L1, L2, L3, L4
2	**Exploratory Data Analysis** Introduction, Steps in Data Preprocessing, Understanding Data, Looking at the Data, Dealing with Missing Values, Standardizing Data, Steps involved in EDA using Python Programming	9	L1, L2, L3
3	**Types of Machine Learning Algorithms** Introduction, Supervised Learning Algorithms- Regression, Classification, and Unsupervised Learning Algorithms- Clustering, Association Rule Mining	9	L1, L2, L3, L4
4	**Data Modelling: Feature Selection, Engineering, and Data Pipelines** Feature Selection, Dimensionality Reduction, Independent and Dependent Variables, Relationship between Variables: Correlation, Multicollinearity, Factor Analysis, Treatment of Outliers	8	L1, L2, L3
5	**Data Visualization** Importance of Data Visualization, Looking at Data, Visualization of Data- Histogram, Countplot, Boxplot, Data Visualization for Machine Learning, Data Visualization Techniques,	8	L1, L2, L3, L4
6	**Applying Domain Expertise to Solve Real-World Problems Using Data Science** Applications of Analytics in Healthcare, Applications of Analytics in Agriculture, Applications of Analytics in Business, Applications of Analytics in Sports	5	L1, L2
	Total Hours	**45**	

Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	Introduction to Data Science	B.Uma Maheshwari, R.Sujatha	Wiley	First Edition	2021
2	Doing Data Science	Rachel Shutts and Cathy O'Neil	O Reilly	Second Edition	2014
3	Data Science for Dummies	Lillian Pierson	Wiley	Second Edition	2019
4	Data Science and Analytics for Ordinary People	Dr. Jeffrey Strickland	Lulu Inc.	-	-
5	Python for Data Science	Dr. Mohd Abdul Hameed	Wiley	First Edition	2021

Online References:

S. No.	Website Name	URL	Modules Covered
1	www.geeksforgeeks.org	https://www.geeksforgeeks.org/introduction-data-science-skills-required/	M1
2	www.edureka.co	https://www.edureka.co/blog/what-is-data-science/	M1-M6
3	www.w3schools.in	https://www.w3schools.in/python-data-science/	M1-M3, M5

List of Practical/ Experiments:

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	Demonstrate Data Munging in Python	2	L1, L2, L3
2		Demonstrate steps involved in EDA using Python	2	L1, L2, L3
3	**Design Experiments**	Demonstrate Data Preprocessing and Visualization using Excel.	2	L1, L2, L3
4		Implement Supervised Learning using Python programming.	2	L1, L2, L3
5		Implement Unsupervised Learning using Python programming.	2	L1, L2, L3
6		Demonstrate Feature Selection Techniques in Python.	2	L1, L2, L3
7		Identification of outliers and treating them	2	L1, L2, L3
8		Demonstrate Visualization of data using Python	4	L1, L2, L3
9		Demonstrate Visualization Tool like Tableau	4	L1, L2, L3, L4
10	**Mini/Minor Projects/ Seminar/ Case Studies**	1. Recommendation System 2. Predictive Analytics 3. Text Mining 4. Sentiment Analysis	8	L1, L2, L3, L4
		Total Hours	**30**	

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective II Data Security and Access Control							**Course Code :**PEC-CSME1022		
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**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Database Management									

Course Objective: The objective of the course is to provide fundamentals of database security. Various access Control techniques mechanisms were introduced along with application areas of access control techniques.

Course Outcomes: Students should be able to:

S.No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	In this course, the students will be enabled to understand and implement classical models and algorithms	Understand (U)
2.	They will learn how to analyses the data, identify the problems, and choose the relevant models and algorithms to apply.	Apply(A)
3.	They will further be able to assess the strengths and weaknesses of various access control models and to analyse their behaviour.	Apply(A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction to Access Control, Purpose and fundamentals of access control, brief history, Policies of Access Control, Models of Access Control, and Mechanisms, Discretionary Access Control (DAC), Non-Discretionary Access Control, Mandatory Access Control (MAC). Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations.	9	Understand (U)
2	Role-Based Access Control (RBAC) and Limitations, Core RBAC, Hierarchical RBAC, Statically Constrained RBAC, Dynamically Constrained RBAC, Limitations of RBAC. Comparing RBAC to DAC and MAC Access control policy.	8	Apply(A)
3	Biba' sintrigity model, Clark-Wilson model, Domain type enforcement model, mapping the enterprise view to the system view, Role hierarchies-inheritance schemes, hierarchy structures and inheritance forms, using SoD in real system. Temporal Constraints in RBAC, MAC AND DAC. Integrating RBAC with enterprise IT infrastructures: RBAC for WFMSs, RBAC for UNIX and JAVA environments Case study: Multi line Insurance Company	10	Analyze (AN)
4	Smart Card based Information Security, Smart card operating system fundamentals, design and implantation principles, memory organization, smart card files, file management, atomic operation, smart card data transmission ATR, PPS Security techniques- user identification, smart card security, quality assurance and testing, smart card life cycle-5 phases, smart card terminals.	10	Analyze (AN)
5	Recent trends in Database security and access control mechanisms. Case study of Role-Based Access Control (RBAC) systems.	7	Apply (A)
6	Recent Trends related to data security management, vulnerabilities in different DBMS.	4	Apply (A)

Reference Books:

1. Role Based Access Control: David F. Ferraiolo, D. Richard Kuhn, RamaswamyChandramouli.
2. http://www.smartcard.co.uk/tutorials/sct-itsc.pdf : Smart Card Tutorial.

M.E. Semester –I

ME (Computer Engineering)									**SEM :** I
Course Name: Professional Elective II Data Storage Technologies and Networks									**Course Code :** PEC-CSME1023
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**	**IA**	**ESE**			
3	-	-	3	3	25	75	-	-	**100**
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Basic knowledge of Computer Architecture, Operating Systems, and Computer Networking is required									

Course objectives:

1. To provide learners with a basic understanding of Enterprise Data Storage and Management Technologies

Course outcomes: Students should be able to:

SN	Course Outcomes	Cognitive levels as per blooms Taxonomy
1	Learn Storage System Architecture	Understand (U)
2	Overview of Virtualization Technologies, Storage Area Network.	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Storage Media and Technologies:** Magnetic, Optical and Semiconductor Media, Techniques for read/write Operations, Issues and Limitations.	8	Analyze (AN)
2	**Usage and Access:** Positioning in the Memory Hierarchy, Hardware and Software Design for Access, Performance issues.	9	Analyze (AN)
3	**Large Storages:** Hard Disks, Networked Attached Storage, Scalability issues, Networking issues.	7	Apply(A)
4	**Storage Architecture:** Storage Partitioning, Storage System Design, Caching, Legacy Systems.	9	Analyze (AN)
5	**Storage Area Networks:** Hardware and Software Components, Storage Clusters/Grids. **Storage QoS:** Performance, Reliability, and Security issues.	10	Analyze (AN)
6	Recent Trends related to Copy data management, Erasure coding, and Software defined storage appliances.	5	Apply(A)

Reference Books:

1. The Complete Guide to Data Storage Technologies for Network-centric Computing Paperback–Import, Mar 1998 by Computer Technology Research Corporation
2. Data Storage Networking: Real World Skills for the CompTIA Storage by Nigel Poulton

M.E. Semester –I

ME (Computer Engineering)								**SEM: I**		
Course Name: Professional Elective II Computer Vision and Image Processing								**Course Code:** PEC- CSME1024		
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**
The or y	**Tutorial**	**Practical/ I TP**	**Contact Hour s**	**Credit**	**I A**	**IE**	**ESE**	**PR/ OR**	**T W**	
3	-	2@	5	4	20			25	25	**150**
IA: In-Semester Assessment - Paper Duration – 1 Hour **ESE: End Semester Examination - Paper Duration - 2 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 level of expertise in programming and mathematics										

Course Objective: The course should be able to introduce the computer vision algorithms, methods and concepts which will enable the student to implement computer vision systems with emphasis on applications and problem solving

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	Understand fundamentals of Digital image processing	L1, L2, L3,
2	Study and apply Image enhancement techniques	L1, L2, L3, L4
3	Apply morphological techniques on images	L1, L2, L3, L4
4	Apply segmentation techniques on images	L1, L2, L3, L4
5	Understand various area extraction and region analysis techniques	L1, L2, L3, L4
6	Apply various compression techniques on images	L1, L2, L3, L4, L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Digital Image Fundamentals** Introduction to Digital Image, Digital Image Processing System, Sampling and Quantization, Representation of Digital Image, Connectivity Image File Formats: BMP, TIFF and JPEG.	6	L1, L2, L3
2	**Image Enhancement in Spatial Domain** Gray Level Transformations, Zero Memory Point Operations, Histogram Processing, Histogram equalization. Neighborhood Processing, Spatial Filtering, Smoothing and Sharpening Filters, Median Filter.	10	L1, L2, L3, L4
3	**Recognition Methodology and Morphological Image Processing** **Recognition Methodology**: Conditioning, Labeling, Grouping, Extracting, Matching **Morphological Image Processing**: Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on grayscale images, Thinning, Thickening, Region growing, region shrinking.	8	L1, L2, L3, L4
4	**Binary Machine Vision** Thresholding, Segmentation, connected component labeling, Hierarchal segmentation, Spatial clustering, Split & merge, Rule-based Segmentation, Motion-based segmentation	5	L1, L2, L3, L4
5	**Area Extraction and Region Analysis** **Area Extraction:** Concepts, Data-structures, Edge, Line-Linking, Hough transform, Line fitting, Curve fitting (Least-square fitting). **Region Analysis:** Region properties, External points, Spatial moments, Mixed spatial gray-level moments, Boundary analysis: Signature properties, Shape numbers.	8	L1, L2, L3, L4
6	**Image Compression** Introduction, Redundancy, Fidelity Criteria, Lossless Compression Techniques: Run Length Coding, Arithmetic Coding, Huffman Coding, Differential PCM Lossy Compression Techniques: Improved Gray Scale Quantization, Vector Quantization	8	L1, L2, L3, L4, L5
	Total Hours	**45**	

Books and Reference:

SN	Title	Authors	Publisher	Edition	Year
1	Computer Vision : A Modern Approach	David Forsyth, Jean Ponce	Pearson Education India	Second	2015
2	Image Processing, Analysis,and Machine Vision	Milan Sonka, Vaclav	Cengage India	Fourth	2017
3	Fundamentals of Digital Images Processing	Anil K. Jain	Pearson Education India	Fourth	2015
4	Digital Image Processing	Rafael C. Gonza Lez, Richard E. Woods	Pearson Education India	Fourth	2018

Online Resources:

S. No.	Website Name	URL	Modules Covered
1	www.nptel.ac.in	https://nptel.ac.in/courses/106/105/106105216/	M1 – M2
2	www.coursera.org	https://www.coursera.org/learn/computer-vision-basics	M3 -M5
3	www.coursera.org	https://www.coursera.org/projects/computer-vision-objectdetection	M3 – M6

Mini Project Hours Distribution:

Sr. No	Work to be done	No. of Hours	Cognitive levels of attainment as per Bloom's Taxonomy
1	Study tools for implementation	4	L1, L2
2	Project Title Identification	2	L1, L2
3	Choose types of images	2	L1, L2
4	Image Enhancement techniques	4	L1, L2, L3
5	Segmentation and Morphology operations	2	L1, L2, L3
6	Algorithm selection	2	L1, L2, L3, L4
7	Train and Validate Model on various images	6	L1, L2, L3, L4
8	Test and Evaluate Model	4	L1, L2, L3, L4, L5
9	Prepare report	4	L1, L2
	Total Hours	**30**	

M.E. Semester –I

<table>
<tr><td colspan="6">ME (Computer Engineering)</td><td colspan="4">SEM : I</td></tr>
<tr><td colspan="6">Course Name: Professional Elective II
Robotics & Automation</td><td colspan="4">Course Code : PEC-CSME1025</td></tr>
<tr><td colspan="6">Teaching Scheme (Program Specific)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="6">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>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">IA: Internal Assessment consist of ISE (In-semester Examination) and IE (Innovative Examination)
Duration of ISE: 1 Hour
2@: Capstone Project , 2hrs/week</td></tr>
<tr><td colspan="10">ESE : - End Semester Examination Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Programming Languages, Software process.</td></tr>
</table>

Course Objective: The course intends to deliver the fundamentals concepts of robotic process automation and theuse of various tool for process automation in detail. It also focusses on the development of bots and its deployment.

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

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Understand and analyze business functionalities in Robotics Process Automation	L1, L2,L4
2	Analyze various tool software bots development	L1,L2,L3
3	Understand and apply variable and data manipulation using tool	L1,L2,L4
4	Implementing recorder and scraping utility for robotic process automation	L2,L3,L5
5	Perform exception handling and error reporting for RPA	L2,L3
6	Understand the steps involve for publishing the bots for automation	L2,L3, L5

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels ofattainment as per Bloom's Taxonomy
1	**Introduction** Robotic process automation need, benefits, component of RPA, databases, API Programming interface, Artificial Intelligence, Cognitive Automations, Agile , Scrum, Kanban and waterfall. Natural language processing and RPA	**07**	L1, L2,L4
2	**Workflow , Conditional , Looping Statements** Introduction, Installation and activation, Interfaces, Different types of workflows, Creating-a-basic-workflow, Debugging, Managing packages, Reusing Library, Source control, Activities guide, Workflow, ControlFlow, Sequences, Flowcharts, State Machines, Control Flows, The- assign-activity, The-delay-activity, The-do-while-activity, The-if- activity, The-switch-activity, The-while-activity, The-for-each-activity,The-break-activity	**09**	L1,L2,L3
3	**Variable , Data table and Recording for RPA** Managing-variables, Naming-best-practices, The-variables-panel, Generic-value-variables, Text-variables, True-or-false-variables, Number-variables, Array-variables, Date-and-time-variables, Data-table-variables, Managing- arguments, Using-arguments, Data Manipulations, Data table , Excel Automation,	**09**	L1,L2,L4
4	**Recording and Scraping** Recording Introduction, Recording Types- Automatic Recording, ManualRecording **Scraping :** Elements, Output-or-screen-scraping-methods, Examples-of-using-output-or-screen-scraping-methods, About-web-scraping, Example-of-using-web-scraping, data scraping	**09**	L2,L3,L5
5	**Exception Handling , Debugging and Logging Exception Handling** Unavailability of element, Handling runtime exceptions, Logging and taking screenshot, Debugging techniques, Collecting crush dumps, Error reporting.	**08**	L2,L 3
6	**Deploy and Marinating Bots publishing using utility** Publishing workflow, Writing editing publish package to .jsonfile. Overview of Orchestration Server- Queues, assets, process, developing a process. Using an Orchestration server to control bots. Publish and managing update.	**06**	L2,L3, L5
	Total Hr.	45	

@: 2 hrs / week for Capstone Project based on the recent topics. Topics can be real time problem statements from industry or other organizations. Progress of the project will be checked on a weekly basis.
Term work consists of at least 2 formative assessments, attendance in lab and project report.

Capstone Project hours:

Work to be done	Hrs.	Cognitive levels of attainment asper Bloom's Taxonomy
Identification and Study RPA tool	4	L1,L2
Project Title Identification and Group formation / Installation ofRPA tool	2	L1,L2
Creating-a-basic-workflow w.r.t to the project	2	L1,L2,L3
Modelling or prototype design	2	L1,L2,L3
Implementation (it should include features learn during incurriculum)	12	L1,L2,L3,L5
Testing of the project	4	L2,L3
Report writing and Presentation	4	L1,L2,L3,L
Total Hours	**30**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	Learning Robotic Process Automation Create software robots and automate business process with the leading RPA tool	Alok Mani Tripathi	Packt	1st	2018
2.	Robotic Process Automation Projects: Build real-world RPA solutions using UiPath and Automation Anywhere	Nandan Mullakara , Arun Kumar Asokan	Packt	1st	2020
3.	The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems 1st ed. Edition	Tom Taulli	Apress	1st	2020

Online Recourses:

S. No.	Website Name	URL	Modules covered
1.	https://www.tutorialspoint.com	https://www.javatpoint.com/rpa	M1
2.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_working.htm	M2
3.	https://www.uipath.com	https://www.uipath.com/developers/video-tutorials/excel-and-datatables-automation	M3
4.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/uipath/uipath_studio_data_scraping_and_screen_scraping.htm	M4
5.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/uipath/uipath_studio_automation_projects_and_debugging.htm	M5
6.	https://docs.uipath.com	https://docs.uipath.com/orchestrator/docs/publishing-a-project-from-studio-to-orchestrator	M6

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective II Advanced Soft Computing							**Course Code :** PEC-CSME1026		
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**	**IA**	**ESE**			**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Algorithms, DBMS									

Course objectives:

To understand the concepts of advanced soft computing, to enable to develop applications of advanced soft computing in instrumentation

Course outcomes: Students should be able to:

Sr. No.	Course Outcomes
1	Apply soft computing techniques to solve engineering problems.
2	Handle multi-objective optimization problems.
3	Apply advanced AI techniques of swarm intelligence , particle swarm optimization, ant-colony optimization and petrinets.
4	Apply rough set theory and granular computing to solve process control applications
5	To apply advanced soft computing & programming concepts

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels ofattainment as per Bloom's Taxonomy
1	**Introduction** Introduction to soft computing, application areas of soft computing, classification of soft computing techniques, structure & functioning of biological brain & Neuron, and concept of learning/training. Model of an Artificial Neuron, transfer/activation functions, perceptron, perceptron learning model, binary & continuous inputs, linear separability.	**10**	L1, L2,L4
2	**Multilayer Neural Networks** Feed Forward network - significance, training, loss function, Back-Propagation algorithm, convergence & generalization, momentum, applications. Feedback network -Hopfield Nets: architecture, energy functions, training algorithms & examples, competitive learning, self-organizing maps. Introduction to CNN and RNN network.	**09**	L1,L2,L3
3	**Fuzzy Systems** fuzzy set theory, fuzzy sets and operations, membership functions, concept of fuzzy relations and their composition, concept of fuzzy Measures. Fuzzy logic: fuzzy rules, inferencing. Fuzzy Control system: selection of membership functions, Fuzzyfication, rule based design & inferencing, defuzzyfication, applications of fuzzy system.	**10**	L1,L2,L4
4	**Genetic algorithm:** Genetic algorithm concepts, creation of offspring, working principle, encoding, fitness functions, reproduction, genetic modeling. Generation cycle & convergence of GA, application areas of GA.	**05**	L2,L3,L5
5	**Advanced soft computing techniques:** Rough Set Theory - Introduction, Set approximation, Rough membership, Attributes, optimization. SVM - Introduction, obtaining the optimal hyper plane, linear and nonlinear SVM classifiers. Introduction to Swarm Intelligence, Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc.	**08**	L2,L3
6	**Application of Advanced Soft Computing** Program Specific Applications, Domain Specific Applications	**03**	L2,L3, L5
	Total Hr.	**45**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	A Road to Non-invasive Knowledge Discovery : Rough set data analysis	Duntsch,I and Gediga, G	-----	1st	2006
2.	Fuzzy Sets and Fuzzy Logic, Theory and Applications	Klir, G. J., Yuan, Bo	Hall of India Private Limited	1st	2007
3.	Fuzzy Logic with Engineering Applications	Ross, T.J., , Wiley	-----	2nd	2004

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name: Professional Elective II Mobile Application Development							**Course Code :** PEC-CSME1027		
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**	**IA**	**ESE**			**100**
3	-	-	3	3	25	75	-	-	
IA: In-Semester Assessment - Paper Duration –**1.5 Hours** **ESE:**End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Algorithms, DBMS									

Course objectives:

The course intends to deliver principles of modern windows application development

Course outcomes: Students should be able to:

Sr. No.	**Course Outcomes**
1	Understand introduction to windows 8 application development
2	Understand principles of modern windows application development
3	Use XAML to create windows 8 style user interfaces
4	Create multi-page applications.
5	To apply advanced programming concepts

Detailed Syllabus:

Module No.	Topics	Hrs.
1	**INTRODUCTION TO WINDOWS 8 APPLICATION DEVELOPMENT** brief history of windows application development, History of APIs and Tools, Operating System Input Methods the Windows Charm Bar, Start Button, Search Button, Share Button, Devices Button, Settings Button, Windows Desktop, Switching between Desktop Programs WINDOWS 8 ARCHITECTURE FROM A DEVELOPER'S POINT OF VIEW - Windows 8 Development Architecture, Desktop Application Layers, Understanding Windows Runtime: Windows Runtime Architecture Overview, Metadata in Windows Runtime, .NET Framework 4.5: The Installation Model of .NET Framework 4.5, Window Runtime Integration, Picking the Appropriate Technology for Your Project, Choosing a Programming Language GETTING TO KNOW DEVELOPMENT ENVIRONMENT - Introducing the Toolset, Visual Studio IDE: Creating a New Project, Lighting Up Your Applications with Expression Blend	9
2	**PRINCIPLES OF MODERN WINDOWS APPLICATION DEVELOPMENT** Windows 8 Style Application, Windows 8 Design Language, Introduction to Asynchronous Programming, Evolution of Asynchronous, Programming on the .NET Platform CREATING WINDOWS 8 STYLE APPLICATIONS WITH HTML5, CSS, AND JAVASCRIPT - HTML5 and CSS on the Web, HTML5 Technologies, HTML5 Applications on Windows Runtime, The Windows Library for JavaScript (WinJS), Creating Windows 8 Style Applications with JavaScript, Accessing the Filesystem, Managing Data, Respecting the User's Device	9
3	**USING XAML TO CREATE WINDOWS 8 STYLE USER INTERFACES** Describing the User Interface Using XAML, Using Namespaces, Understanding the Layout Management System, Reusable Resources in XAML, Basic Controls in Windows 8 Style Applications: Controls with Simply Accessing the Internet: e Values, Content Controls, Working with Data: Data Binding Dependency Properties and Notifications, Binding Modes and Directions WORKING WITH XAML CONTROLS - Using Animations in Application, Designing the Visual Look of a Control, Working with Complex Controls: Getting to Know the List View Base Controls, Using the Grid View Control, Binding to Data, Grouping Data, Defining Visual Groups BUILDING WINDOWS 8 STYLE APPLICATIONS - The Lifecycle of a Windows 8 Application, Deploying Windows 8 Apps, Commanding Surfaces, Persisting Application Data, Applications and the Start Screen	9
4	**CREATING MULTI-PAGE APPLICATIONS** Navigation Basics, working with Pages, Using the Split Application and Grid Application Templates BUILDING CONNECTED APPLICATIONS - Integrating with the Operating System and Other Apps: Picker Unified Design to Access Data, Understanding the Concept of Contracts, Accessing the Internet: Detecting the Changes of Internet Connectivity, Using Feeds, Accessing Windows Live LEVERAGING TABLET FEATURES - Accommodating Tablet Devices, Building Location-Aware	9

	Applications, Using Sensors: Using Raw Sensor Data, Using Sensor Fusion Data	
5	**ADVANCED PROGRAMMING CONCEPTS** Building Solutions with Multiple Languages: Hybrid Solutions, Background Tasks: Understanding Background Tasks, How Background Tasks Work, Cancelling Background Tasks, Implementing Background Tasks, creating a Simple Background Task, Managing Task Progress and Cancelation, Input Devices TESTING AND DEBUGGING WINDOWS 8 APPLICATIONS - The Quality of Software, Becoming Familiar with Debugging, Controlling the Program Flow in Debug Mode, Monitoring and Editing Variables, Changing the Code While Debugging, Windows 8 Style Application-Specific Scenarios, Introduction to Software Testing, Introduction to Unit Testing, Unit Testing Windows 8 Style Applications INTRODUCING THE WINDOWS STORE - Getting to Know the Windows Store, How Customers See an App in the Windows Store, Application Details, Making Money with Your App, The Developer Registration Process: Submitting the Application, The Application Certification Process, The Windows App Certification Kit.	9
	Total Hours	**45**

M.E. Semester –I

M.E. (Computer Engineering)									**SEM : I**
Course Name: Professional Elective II Project Management									**Course Code :** PEC-CSME1028
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**	**IA**	**ESE**	**PR/OR**	**TW**	
3	-	-	3	3	25	75	-	-	**100**
IA: In-Semester Assessment - Paper Duration – 1 Hours **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: Data Structure, Software Engineering									

Course Objective: The objective of the course is to familiarize the students with the use of a structured methodology/approach for each and every unique project undertaken, including utilizing project management concepts, tools and techniques and appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

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	Apply selection criteria and select an appropriate project from different options	L1, L2, L3, L4
2	Write work break down structure for a project and develop a schedule based on it	L1, L2, L3, L4
3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.	L1, L2, L3, L4
4	Use Earned value technique and determine & predict status of the project.	L1, L2, L3, L4
5	Compare and contrast various project execution, Monitoring and Controlling Projects, Project Contracting, Project Leadership and Ethics and Closing the Project	L1, L2, L3, L4
6	Capture lessons learned during project phases and document them for future reference	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Project Management Foundation** Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical & atypical) Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Project management in various organization structures, PM knowledge areas as per Project Management Institute (PMI).	6	L1, L2, L3, L4
2	**Initiating Projects** How to get a project started, Selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter; Project proposal. Effective project team, Stages of team development & growth (forming, storming, norming &performing), team dynamics	6	L1, L2, L3, L4
3	**Project Planning and Scheduling** Work Breakdown structure (WBS) and linear responsibility chart, Interface Co-ordination and concurrent engineering, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques. PERT, CPM, GANTT chart, Introduction to Project Management Information System (PMIS).	8	L1, L2, L3, L4
4	**Planning Projects** Crashing project time, Resource loading and levelling, Goldratt's critical chain, Project Stakeholders and Communication plan Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability and impactmatrix. Risk response strategies for positive and negative risks	8	L1, L2, L3, L4
5	**Executing Projects, Monitoring and Controlling Projects & Project Contracting** 5.1 Executing Projects: Planning monitoring and controlling cycle, Information needs and reporting, engaging with all stakeholders of the projects, Team management, communication and project meetings 5.2 Monitoring and Controlling Projects: Earned Value Management techniques for measuring value of work completed; Using milestones for measurement; change requests and scope creep, Project audit. 5.3 Project Contracting : Project procurement management, contracting and outsourcing,	10	L1, L2, L3, L4
6	**Project Leadership and Ethics & Closing the Project** 6.1 Project Leadership and Ethics: Introduction to project leadership, ethics in projects, Multicultural and virtual projects 6.2 Closing the Project: Customer acceptance; Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report; doing a lessons learned analysis; acknowledging successes and failures; Project management templates and other resources; Managing without authority; Areas of further study.	7	L1, L2
	Total Hours	**45**	

Books and References:

S.No	Title	Authors	Publisher	Edition	Year
1	Project Management Foundation:	Project Management: A managerial approach, Jack Meredith & Samuel Mantel.	Wiley India	Seventh Edition	2009
2	Initiating Projects & Project Planning and Scheduling	A Guide to the Project Management Body of Knowledge (PMBOK® Guide)	Project Management Institute PA, USA	Fifth Edition	--
3	Planning Projects	Project Management, Gido Clements	Cengage Learning	--	--
4	Executing Projects, Monitoring and Controlling Projects & Project Contracting	Project Management, Gopalan Wiley India	Wiley India	--	--
5	Project Leadership and Ethics & Closing the Project	Project Management, Dennis Lock.	Gower Publishing England	Ninth Edition	--

Online Resources:

S. No.	Website Name	URL	Modules Covered
1	http://www.opentextbooks.org.hk	http://www.opentextbooks.org.hk/system/files/export/15/15694/pdf/Project_Management_15694.pdf	M1-M6
2	https://www.nesacenter.org	https://www.nesacenter.org/uploaded/conferences/SEC/2014/handouts/Rick_Detwiler/15_Detwiler_Resources.pdf	M1-M3, M6
3	http://www.edo.ca	http://www.edo.ca/downloads/project-management.pdf	M1,M4

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name : Research Methodology and IPR							**Course Code :** MC-CSME101		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**			
2	-	-	2	2	15	35	-	-	**50**
IA: In-Semester Assessment - Paper Duration –**1 Hours** **ESE:**End Semester Examination - Paper Duration - **2 Hours**									
Prerequisite: Basics of Statistics									

Course Objective:

At the end of this course, students should be able to

- Understand research problem formulation
- Analyze research related information
- Analyze today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity
- Apply knowledge in IPR and realize IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular

Course Outcomes:

At the end of this course, students will be able to

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand research problem formulation.	Apply(A)
2	Analyze research related information	Analyze(An)
3	Follow research ethics	Apply(A)
4	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	Apply(A)
5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.	Apply(A)
6	Understand that IPR protection provides an incentive to inventors for further research work and	Apply(A)
	investment in R & D, which leads to creation of new and better products, and in turn bringsabout, economic growth and social benefits.	

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	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	4	Apply (A)
2	Effective literature studies approaches, analysis Plagiarism, Research ethics,	4	Analyze (An)
3	Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee	4	Apply (A)
4	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.	4	Apply (A)
5	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	4	Apply (A)
6	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.	4	Apply (A)

Reference Books:

- Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
- Mayall, "Industrial Design", McGraw Hill, 1992.
- Niebel, "Product Design", McGraw Hill, 1974.
- Asimov, "Introduction to Design", Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
- T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name : English for research paper writing							**Course Code :**AC-CSME001		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**

IA: In Semester Assessment
ESE : End Semester Examination
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)

Course Objectives:

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 at very first-time submission

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4	Understand (U)
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction	4	Understand (U)
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4	Understand (U)
4	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	Apply (A)
5	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	Apply (A)
6	Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4	Analyze (AN)

Reference Books:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books).
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York DordrechtHeidelberg London, 2011

M.E. Semester –I

ME (Computer Engineering)							**SEM :** I		
Course Name : Disaster management							**Course Code :**AC-CSME002		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**

IA: In Semester Assessment

ESE : End Semester Examination

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

Course Objectives:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. 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.

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Introduction:** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4	Understand (U)
2	**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	Understand (U)
3	**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	Understand (U)
4	**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	Analyze (AN)
5	**Risk Assessment:** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4	Understand (U)
6	**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	Understand (U)

Reference Books:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'NewRoyal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall OfIndia, New Delhi.
3. Goel S. L., "Disaster Administration And Management Text And Case Studies",Deep&DeepPublication Pvt. Ltd., New Delhi

M.E. Semester –I

ME (Computer Engineering)							**SEM:** I		
Course Name: Sanskrit for technical knowledge							**Course Code:**AC-CSME003		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**
IA: In Semester Assessment **ESE:**End Semester Examination **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)									

Course Objectives:

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 the
6. Huge knowledge from ancient literature.

Course Outcomes:Students should be able to:

S. No.	Course Outcomes	Cognitive levels as perBloom's Taxonomy
1	Understanding basic Sanskrit language	Understand (U)
2	Ancient Sanskrit literature about science & technology can beunderstood	Understand (U)
3	Being a logical language will help to develop logic in students	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences	8	Understand (U)
2	Order, Introduction of roots, Technical information about Sanskrit Literature.	8	Understand (U)
3	Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	8	Understand (U)

Reference Books:

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

M.E. Semester –I

ME (Computer Engineering)							**SEM :** II		
Course Name : Value Education							**Course Code :**AC-CSME004		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	_	_	_	50	50
IA: In Semester Assessment **ESE :**End SemesterExamination **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)									

Course Objectives:

1. Understand value of education and self- development
2. Understand the importance of character
3. Imbibe good values in students

Course Outcomes:Students should be able to:

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Understand value of education and self- development	Apply (A)
2	Understand the importance of character	Apply (A)
3	Imbibe good values in students creating good human beings	Create(C)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	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	Apply (A)
2	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	Apply (A)
3	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	Apply (A)
4	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	Apply (A)

Reference Book:

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

M.E. Semester –I

ME (Computer Engineering)							**SEM:** II		
Course Name: Constitution of India							**Course Code:**AC-CSME005		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**
IA: In Semester Assessment **ESE :**End Semester Examination **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)									

Course objectives:

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

Course Outcomes:Students will be able to:

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	Understand (U)
2.	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	Apply (A)
3.	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.	Apply (A)
4.	Discuss the passage of the Hindu Code Bill of 1956.	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	4	Understand (U)
2	**Philosophy of the Indian Constitution:** Preamble Salient Features	4	Understand (U)
3	**Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties	4	Understand (U)
4	**Organs of Governance:** Parliament Composition Qualifications and Disqualifications Powers and Functions Executive President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions	4	Understand (U)
5	**Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	4	Understand (U)
6	**Election Commission:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women	4	Understand (U)

Reference Books:

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

M.E. Semester –I

ME (Computer Engineering)							**SEM:** II		
Course Name: Pedagogy studies							**Course Code:**AC-CSME006		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**

IA: In Semester Assessment

ESE: End Semester Examination

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

Course Objectives:

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Introduction and Methodology:** Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**.**Overview of methodology and Searching	4	Understand (U)
2	**Thematic overview:**Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education	2	Apply (A)
3	**Evidence on the effectiveness of pedagogical practices** **Methodology for the in depth stage**: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school Curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogicalpractices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies	4	Analyze (AN)
4	**Professional development:** alignment with classroom practices and follow- up support Peer support Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes	4	Apply (A)
5	**Research gaps and future directions:** Research design Contexts Pedagogy Teacher education Curriculum and assessment Dissemination and research impact	2	Analyze (AN)

Reference Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.
2. Agrawal M (2004) curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher educationresearch project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basicmaths and reading in Africa: Does teacher preparation count? International Journal EducationalDevelopment, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education.
6. Oxford and Boston: Blackwell.
7. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
8. www.pratham.org/images/resource%20working%20paper%202.pdf.

M.E. Semester –I

ME (Computer Engineering)							**SEM:** I		
Course Name: Stress Management by yoga							**Course Code:**AC-CSME007		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**
IA: In Semester Assessment **ESE :**End Semester Examination **The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)**									

Course Objectives:

1. To achieve overall health of body and mind
2. To overcome stress

Course Outcomes:Students will be able to:

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Develop healthy mind in a healthy body thus improving social health also	Apply (A)
2	Improve efficiency	Apply (A)

Detailed Syllabus:

Modul eNo.	Topics	Hrs.	Cognitive levels as perBloom's Taxonomy
1	Definitions of Eight parts of yog.(Ashtanga)	8	Understand (U)
2	Yam and Niyam. Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8	Understand (U)
3	Asan and Pranayam i) Various yog poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Types ofpranayam	8	Apply (A)

Reference Books:

1. Yogic Asanas for Group Tarining-Part-I" : Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

M.E. Semester –I

ME (Computer Engineering)							**SEM:** I		
Course Name: Personality Development through Life Enlightenment Skills							**Course Code:**AC-CSME008		
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 (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	
2	-	-	2	-	-	-	-	50	**50**

IA: InSemester Assessment

ESE: EndSemester Examination

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

Course Objectives:

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

Course Outcomes:Students will be able to:

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life	Understand (U)
2.	The person who has studied Geeta will lead the nation and mankind to peace and prosperity	Apply (A)
3.	Study of Neetishatakam will help in developing versatile personality of students.	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Neetisatakam-Holistic development of personality Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue) Verses- 52,53,59 (dont's) Verses- 71,73,75,78 (do's)	8	Understand (U)
2	Approach to day to day work and duties. ShrimadBhagwadGeeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.	8	Apply (A)
3	Statements of basic knowledge. ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personality of Role model. ShrimadBhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	8	Understand (U)

Reference Books:

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
3. Rashtriya Sanskrit Sansthanam, New Delhi.

M.E. Semester –I

ME (Computer Engineering)							**SEM:** I		
Course Name: Laboratory I							**Course Code:** LC-CSME101		
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**	**IA**	**ESE**	**PR/OR**	**TW**	
-	-	4	4	2	-	-	25	25	**50**

IA: In Semester Assessment
ESE : End Semester Examination
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Practical (40%) and Attendance (20%)

Each Laboratory assignment will be done by an individual student. The Faculty teaching core subject will be required to propose the respective Laboratory assignments. These will be essentially hands-on practical /Case Study.

M.E. Semester –I

ME (Computer Engineering)							**SEM:**I		
Course Name: Laboratory II							**Course Code:** LC-CSME102		
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**	**IA**	**ESE**	**PR/OR**	**TW**	
-	-	4	4	2	-	-	25	25	**50**
IA: In Semester Assessment **ESE: End** Semester Examination **The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Practical (40%) and Attendance (20%)**									

Each Laboratory assignment will be done by an individual student. The Faculty teaching elective subject will be required to propose the respective Laboratory assignments. These will be essentially hands-on practical /Case Study.

M.E. Semester –I

ME (Computer Engineering)							**SEM:**I		
Course Name: Industry Certification							**Course Code:** IC-CSME2		
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**	**IA**	**ESE**	**PR/OR**	**TW**	
-	-	4	4	2	-	-	25	25	**50**
IA: In Semester Assessment **ESE: End** Semester Examination **The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Practical (40%) and Attendance (20%)**									

Students are required to do industry certification from the selected specialization.