M.E. Semester –II

<table>
<tr><td colspan="5">ME (Computer Engineering)</td><td colspan="5">SEM : II</td></tr>
<tr><td colspan="5">Course Name :Advanced Algorithms</td><td colspan="5">Course Code :PCC-CSME201</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td rowspan="2">Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td><td>100</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: UG level course in Algorithm Design and Analysis</td></tr>
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Course Objectives:

- Introduce students to the advanced methods of designing and analyzing algorithms.
- The student should be able to choose appropriate algorithms and use it for a specific problem.
- To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems.
- Students should be able to understand different classes of problems concerning their computation difficulties.
- To introduce the students to recent developments in the area of algorithmic design.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Analyse the complexity/performance of different algorithms.	Analyze (AN)
2	Determine the appropriate data structure for solving a particular set of problems.	Analyze (AN)
3	Categorize the different problems in various classes according to their complexity.	Analyze (AN)
4	Students should have an insight of recent activities in the field of the advanced data structure.	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Sorting:** Review of various sorting algorithms, topological sorting Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.	6	Analyze (AN)
2	**Matroids:** Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST. Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.	8	Analyze (AN)
3	**Flow-Networks**: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.	9	Analyze (AN)
4	**Shortest Path in Graphs:** Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming. Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem. Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm	10	Analyze (AN)
5	**Linear Programming:** Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness. One or more of the following topics based on time and interest Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm	10	Analyze (AN)
6	Recent Trands in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.	5	Apply (A)

Reference Books:

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos.

M.E. Semester –II

ME (Computer Engineering)							**SEM :** II		
Course Name : Soft Computing							**Course Code :**PCC-CSME202		
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 Examination - Paper Duration – **1.5 Hour** **ESE :** End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Basic Mathematics									

Course Objective: The course should be able to introduce soft computing techniques (ANN, FL and GA) and implement solutions for real world problems.

Course Outcomes: **Students should be able to:**

SN	Course Outcomes	Cognitive levels as per blooms Taxonomy
1	Summarize various constituents of Soft Computing.	Understand (U)
2	Experiment Fuzzy Inference Systems.	Apply (A)
3	Compare supervised and unsupervised learning networks.	Analyze (AN)
4	Investigate ML approach to knowledge acquisition via GA.	Analyze (AN)
5	Investigate NN and FL toolbox.	Analyze (AN)
6	Summarize recent trends in Deep Learning.	Evaluate (E)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per blooms Taxonomy
1	**Introduction to Soft Computing and Neural Networks** Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics	7	Apply (A)
2	**Fuzzy Logic** Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions:, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making	8	Analyze (AN)
3	**Neural Networks** Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks	10	Analyze (AN)
4	**Genetic Algorithms** Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.	5	Apply (A)
5	**Matlab /Python Lib** Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic	13	Analyze (AN)
6	**Expert System** Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	5	Analyze (AN)

Reference Books:

1. "Neuro: Fuzzy and Soft Computing" by Jyh: Shing Roger Jang, Chuen: Tsai Sun, Eiji Mizutani, Prentice Hall of India, 3rd edition, 2003.
2. "Fuzzy Sets and Fuzzy Logic: Theory and Applications" by George J. Klir and Bo Yuan, Prentice Hall of India, 1st edition, 1995.

M.E. Semester –II

M.E. (Computer Engineering)							M.E. SEM : II		
Course Name : Data Science							**Course Code :** PEC-CSME2012		
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 **– 1.5 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, data science 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 and APIs, 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 for visualisation: Data types, Data encodings, Retinal variables, Mapping variables to encodings, 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.

ME (Computer Engineering)									**SEM :** II
Course Name : Web Analytics and Development									**Course Code :** PEC-CSME2022
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 Mining									

Course Objective: To explore use of social network analysis to understand growing connectivity and complexity in the world ranging from small groups to WWW.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom’s Taxonomy
1	Understand Social network and Web data and methods	Apply(A)
2	Compare different web analytics tools	Analyze (AN)
3	Perform Web Search and Retrieval	Apply(A)
4	Understand Network evolution	Understand(U)
5	Become familiar with core research communities, publications, focused on web and social media analytics and research questions engaged in	Apply(A)
6	Investigate Social involvements and diffusion of innovation	Analyze (AN)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction – Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization	10	Apply(A)
2	Web Analytics tools: Click Stream Analysis, A/B testing, Online Surveys	8	Apply(A)
3	Web Search and Retrieval: Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models	9	Analyze (AN)
4	Making Connection: Link Analysis, Random Graphs and Network evolution,	8	Evaluate (E)
5	Social Connects: Affiliation and identity	4	Evaluate (E)
6	Connection: Connection Search, Collapse, Robustness Social involvements and diffusion of innovation	9	Apply (A)

Reference Books:

1. Hansen, Derek, Ben Sheiderman, Marc Smith. 2011. Analyzing Social Media Networks with Node XL: Insights from a Connected World. Morgan Kaufmann, 304.
2. Avinash Kaushik. 2009. Web Analytics 2.0: The Art of Online Accountability.
3. Easley, D. & Kleinberg, J. (2010). Networks, Crowds, and Markets: Reasoning About a Highly Connected World. New York: Cambridge University Press. http://www.cs.cornell.edu/home/kleinber/networks-book/
4. Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. New York: Cambridge University Press. Monge, P. R. & Contractor, N. S. (2003). Theories of communication networks. New York: Oxford University Press.

M.E. Semester –II

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**	**50**
2	-	-	2	-	-	-	-	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 pedagogical practices. 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 education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 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 –II

ME (Computer Engineering)							**SEM :** II		
Course Name : Data Visualisation							**Course Code :**PEC-CSME2011		
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 –**1.5 Hours** **ESE:** End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Computer Graphics, Image Processing									

Course Objectives:

1. Familiarize students with the basic and advanced techniques of information visualization and scientific visualization
2. To learn key techniques of the visualization process
3. A detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Design process to develop visualization methods and visualization systems, and methods for their evaluation.	Apply(A)
2	preparation and processing of data, visual mapping and the visualization	Apply(A)
3	Understand large-scale abstract data,	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.	8	Understand (U)
2	Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.	8	Apply(A)
3	Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.	10	Apply(A)
4	Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization	11	Apply(A)
5	Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations	7	Apply(A)
6	Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.	4	Understand (U)

Reference Books:

1. WARD, GRINSTEIN, KEIM, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick: A K Peters, Ltd.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="3">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Data Warehousing and Data Mining</td><td colspan="3">Course Code :PEC-CSME2013</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
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<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Databases, Probability</td></tr>
</table>

Course Objective: The objective of this course is to introduce data warehousing and mining techniques. Application of data mining in web mining, pattern matching and cluster analysis is included to aware students of broad data mining areas.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom’s Taxonomy
1.	Study of different sequential pattern algorithms	Remember (R)
2.	Study the technique to extract patterns from time series data and it application in real world.	Remember (R)
3.	Can extend the Graph mining algorithms to Web mining	Apply (A)
4.	Help in identifying the computing framework for Big Data	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction to Data Warehousing; Data Mining: Mining frequent patterns, association and correlations; Sequential Pattern Mining concepts, primitives, scalable methods;	7	Understand (U)
2	Classification and prediction; Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns	8	Apply (A)
3	Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis	8	Apply (A)
4	Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining; Social Network Analysis	11	Apply (A)
5	Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining.	9	Apply (A)
6	Recent trends in Distributed Warehousing and Data Mining, Class Imbalance Problem; Graph Mining; Social Network Analysis	5	Apply (A)

Reference Books:

1. Jiawei Han and M Kamber, Data Mining Concepts and Techniques, Second Edition, Elsevier Publication, 2011.
2. Vipin Kumar, Introduction to Data Mining - Pang-Ning Tan, Michael Steinbach, Addison Wesley, 2006.
3. G Dong and J Pei, Sequence Data Mining, Springer, 2007.

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="3">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Sensor Networks and Internet of Things</td><td colspan="3">Course Code :PEC-CSME2014</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
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<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Wireless Networks</td></tr>
</table>

Course Objectives:

1. The course gives an overview of various topics related to wireless sensor networks, which are expected to be the basis for the emerging internet-of-things
2. The course covers topics with relation to various sub disciplines of computer science such as hardware, operating systems, distributed systems, networking, security and databases.
3. Able to understand wireless sensor network (WSN) specific issues such as localization, time synchronization, and topology control are addressed as well.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	Identify requirements from emerging WSN applications on WSN platforms, communication systems, protocols and middleware	Understand (U)
2.	Understand, compare and evaluate communication and network protocols used in WSNs	Understand (U)
3.	Discuss and evaluate mechanisms and algorithms for time synchronization and localization in WSNs	Apply (A)
4.	Understand and discuss requirements for the design of security mechanisms and middleware systems to be used in WSNs	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Introduction and Applications**: smart transportation, smart cities, smart living, smart energy, smart health, and smart learning. Examples of research areas include for instance: Self-Adaptive Systems, Cyber Physical Systems, Systems of Systems, Software Architectures and Connectors, Software Interoperability, Big Data and Big Data Mining, Privacy and Security	8	Understand (U)
2	**IoT Reference Architecture**- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **Real-World Design Constraints**- Introduction, Technical Design constraints hardware, Data representation and visualization, Interaction and remote control	9	Apply (A)
3	**Industrial Automation**- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things. **Commercial Building Automation-** Introduction, Case study: phase one-commercial building automation today, Case study: phase two-commercial building automation in the future.	9	Apply (A)
4	Hardware Platforms and Energy Consumption, Operating Systems, Time Synchronization, Positioning and Localization, Medium Access Control, Topology and Coverage Control, Routing: Transport Protocols, Network Security, Middleware, Databases	10	Understand (U)
5	IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device Board, Linux on Raspberry, Interface and Programming & IOT Device	7	Apply (A)
6	Recent trends in sensor network and IOT architecture, Automation in Industrial aspect of IOT	5	Understand (U)

Reference Book:

1. Mandler, B., Barja, J., Mitre Campista, M.E., Cagáová, D., Chaouchi, H., Zeadally, S. ,Badra, M., Giordano, S., Fazio, M., Somov, A., Vieriu, R.-L., Internet of Things. IoT Infrastructures, Springer International Publishing Data mining and knowledge discovery handbook by Maimon, oded (et al.)

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Data Visualisation for IoT</td><td colspan="4">Course Code :PEC-CSME2015</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>
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<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Computer Graphics, Image Processing</td></tr>
</table>

Course Objectives:

1. Familiarize students with the basic and advanced techniques of information visualization and scientific visualization
2. To learn key techniques of the visualization process
3. A detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1	Design process to develop visualization methods and visualization systems, and methods for their evaluation.	Apply(A)
2	preparation and processing of data, visual mapping and the visualization	Apply(A)
3	Understand large-scale abstract data,	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.	8	Understand (U)
2	Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.	8	Apply(A)
3	Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.	10	Apply(A)
4	Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization	11	Apply(A)
5	Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations	7	Apply(A)
6	Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.	4	Understand (U)

Reference Books:

1. WARD, GRINSTEIN, KEIM, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick : A K Peters, Ltd.
2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

M.E. Semester –II

ME (Computer Engineering)							**SEM :** II		
Course Name : IoT Applications and Communication Protocols							**Course Code :**PEC-CSME2016		
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 –**1.5 Hours** **ESE:** End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Computer Networks									

Course Objectives:

1. Basic introduction of all the elements of IoT-Mechanical, Electronics/sensor platform, Wireless and wire line protocols, Mobile to Electronics integration, Mobile to enterprise integration
2. Open source/commercial electronics platform for IoT-Raspberry Pi, Arduino ,ArmMbedLPC
   Open source /commercial enterprise cloud platform for IoT-Ayla, iO Bridge, Libellium, Axeda, Cisco fog cloud

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	To understand merging technological options, platforms and case studies of IoT implementation in home & city automation	Understand (U)
2.	Determine the Market perspective of IoT.	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Basic function and architecture of a sensor — sensor body, sensor mechanism, sensor calibration, sensor maintenance, cost and pricing structure, legacy and modern sensor network. Development of sensor electronics — IoT vs legacy, and open source vs traditional PCB design style Development of sensor communication protocols, Protocols: Modbus, relay, Zigbee, Zwave, X10, Bluetooth, ANT, etc. Business driver for sensor deployment — FDA/EPA regulation, fraud/tempering detection, supervision, quality control and process management. Different kind of calibration Techniques: manual, automation, infield, primary and secondary calibration — and their implication in IoT. Powering options for sensors: battery, solar, Witricity, Mobile and PoE	8	Apply(A)
2	Zigbee and Zwave — advantage of low power mesh networking. Long distance Zigbee. Introduction to different Zigbee chips. Bluetooth/BLE: Low power vs high power, speed of detection, class of BLE. Introduction of Bluetooth vendors & their review. Wireless protocols such as Piconet and packet structure for BLE and Zigbee Other long distance RF communication link. LOS vs NLOS links, Capacity and throughput calculation Application issues in wireless protocols: power consumption, reliability, PER, QoS, LOS	9	Apply(A)
3	PCB vs FPGA vs ASIC design Prototyping electronics vs Production electronics. QA certificate for IoT- CE/CSA/UL/IEC/RoHS/IP65 Basic introduction of multi-layer PCB design and its workflow Electronics reliability-basic concept of FIT and early mortality rate Environmental and reliability testing-basic concepts Basic Open source platforms: Arduino, Raspberry Pi, Beaglebone	9	Apply(A))
4	Introduction to Mobile app platform for IoT: Protocol stack of Mobile app for IoT, Mobile to server integration, iBeacon in IoS, Window Azure, Linkafy Mobile platform for IoT, Axeda, Xively	10	Apply(A)
5	Database implementation for IoT : Cloud based IoT platforms, SQL vs NoSQL, Open sourced vs. Licensed Database, Available M2M cloud platform, Axeda Xively, Omega NovoTech, Ayla Libellium, CISCO M2M platform, AT&T M2M platform, Google M2M platform	7	Apply(A)
6	Recent trends in home automation, IOT-locks, Energy optimization in home	5	Understand (U)

Reference Book:

1. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley-Blackwell.

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Data Security and Access Control</td><td colspan="4">Course Code :PEC-CSME2021</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="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td rowspan="3">Total

100</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Database Management</td></tr>
</table>

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, Ramaswamy Chandramouli.
2. http://www.smartcard.co.uk/tutorials/sct-itsc.pdf : Smart Card Tutorial.

M.E. Semester –II

ME (Computer Engineering)							SEM : II		
Course Name :Knowledge Discovery							Course Code :PEC-CSME2023		
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 –**1.5 Hours** **ESE:** End Semester Examination - Paper Duration - **3 Hours**									
Prerequisite: Data structures, Basic Statistics									

Course Objective: Conduct case studies on real data mining examples.

Course Outcome: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	Have knowledge of various knowledge representation methods	Apply (A)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	**Introduction KDD and Data Mining** - Data Mining and Machine Learning, Machine Learning and Statistics, Generalization as Search, Data Mining and Ethics.	7	Understand (U)
2	**Knowledge Representation** - Decision Tables, Decision Trees, Classification Rules, Association Rules, Rules involving Relations, Trees for Numeric Predictions, Neural Networks, Clusters	10	Apply(A)
3	**Decision Trees** - Divide and Conquer, Calculating Information, Entropy, Pruning, Estimating Error Rates, The C4.5 Algorithm Evaluation of Learned Results- Training and Testing, Predicting Performance, Cross-Validation	9	Analyze (AN)
4	**Classification Rules** - Inferring Rudimentary Rules, Covering Algorithms for Rule Construction, Probability Measure for Rule Evaluation, Association Rules, Item Sets, Rule Efficiency	8	Apply (A)

5	**Numeric Predictions -** Linear Models for Classification and Numeric Predictions, Numeric Predictions with Regression Trees, Evaluating Numeric Predictions	7	Evaluate (E)
6	**Artificial Neural Networks** – Perceptron's, Multilayer Networks, The Back propagation Algorithm **Clustering** - Iterative Distance-based Clustering, Incremental Clustering, The EM Algorithm	4	Understand (U)

Reference Books:

1. Data mining and knowledge discovery handbook by Maimon, oded(et al.)
2. Data Cleansing: A Prelude to knowledge Discovery

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Big Data Analytics for IoT</td><td colspan="4">Course Code :PEC-CSME2024</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="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td rowspan="3">Total
100</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Data Structure, Computer Architecture and Organization</td></tr>
</table>

Course Objectives:

1. Understand big data for business intelligence. Learn business case studies for big data analytics.
2. 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.	Understand (U)
2.	Explain NoSQL big data management	Apply (A)
3.	Install, configure, and run Hadoop and HDFS	Apply (A)
4.	Perform map-reduce analytics using Hadoop	Analyze (AN)
5.	Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics	Understand (U)

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	Understand (U)
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, peer-peer 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	Apply (A)
4	MapReduce workflows, unit tests with MR Unit, 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	9	Apply (A)
5	Hbase, data model and implementations, Hbase clients, Hbase examples, praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.	10	Apply (A)
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	Understand (U)

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 of
4. Polyglot Persistence", Addison-Wesley Professional, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
7. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
8. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
9. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
10. Alan Gates, "Programming Pig", O'Reilley, 2011.

M.E. Semester –II

<table>
<tr><td colspan="6">ME (Computer Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="6">Course Name :Network Security</td><td colspan="4">Course Code :PEC-CSME2025</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">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>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">100</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td></tr>
<tr><td colspan="10">IA: In-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="10">Prerequisite: Computer Networks, Web Programming</td></tr>
</table>

Course Objectives:

1. To learn the basics of security and various types of security issues.
2. To study different cryptography techniques available and various security attacks..
3. Explore network security and how they are implemented in real world.
4. To get an insight of various issues of Web security and biometric authentication.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	To have an understanding of basics of security and issues related to it.	Understand (U)
2.	Understanding of biometric techniques available and how they are used in today's world.	Understand (U)
3.	Security issues in web and how to tackle them.	Analyze(AN)
4.	Learn mechanisms for transport and network security	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Data security: Review of cryptography. Examples RSA, DES, ECC.	6	Understand (U)
2	Authentication, non-repudiation and message integrity. Digital signatures and certificates. Protocols using cryptography (example Kerberos). Attacks on protocols	9	Apply(A)
3	Network security: Firewalls, Proxy-Servers, Network intrusion detection. Transport security: Mechanisms of TLS, SSL, IPSec.	9	Apply(A)
4	Web security – SQL injection, XSS, etc. Software security and buffer overflow. Malware types and case studies. Access Control, firewalls and host/network intrusion detection.	11	Apply(A)
5	Other topics: Biometric authentication, Secure E-Commerce (ex. SET), Smart Cards, Security in Wireless Communication.	8	Apply(A)
6	Recent trends in IOT security, IDS and Biometric.	5	Understand (U)

Reference Books:

1. W. R. Cheswick and S. M. Bellovin. Firewalls and Internet Security. Addison Wesley, 1994.
2. W. Stallings. Cryptography and Network Security. Prentice Hall, 1999.
3. B. Schneier. Applied Cryptography. Wiley, 1999.

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="4">SEM : II</td></tr>
<tr><td colspan="7">Course Name :Advanced Machine Learning</td><td colspan="4">Course Code :PEC-CSME2026</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="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (25)</td><td colspan="2" rowspan="2">Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>3</td><td>3</td><td>25</td><td>75</td><td>-</td><td>-</td><td colspan="2">100</td></tr>
<tr><td colspan="11">IA:I n-Semester Assessment - Paper Duration –1.5 Hours
ESE: End Semester Examination - Paper Duration - 3 Hours</td></tr>
<tr><td colspan="11">Prerequisite: Machine Learning, Probability Theory</td></tr>
</table>

Course Objectives:

1. To introduce key concepts in pattern recognition and machine learning; including specific algorithms for classification, regression, clustering and probabilistic modeling.
2. To give a broad view of the general issues arising in the application of algorithms to analysing data, common terms used, and common errors made if applied incorrectly.
3. To demonstrate a toolbox of techniques that can be immediately applied to real world problems, or used as a basis for future research into the topic.

Course Outcomes: **Students should be able to:**

S. No.	Course Outcomes	Cognitive levels as per Bloom's Taxonomy
1.	Key concepts, tools and approaches for pattern recognition on complex data sets	Understand (U)
2.	Kernel methods for handling high dimensional and non-linear patterns	Apply (A)
3.	State-of-the-art algorithms such as Support Vector Machines and Bayesian networks	Apply (A)
4.	Solve real-world machine learning tasks: from data to inference	Analyze (AN)
5.	Theoretical concepts and the motivations behind different learning frameworks	Understand (U)

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom's Taxonomy
1	Key concepts, Supervised/Unsupervised Learning, Loss functions and generalization, Probability Theory, Parametric vs Non-parametric methods, Elements of Computational Learning Theory Ensemble Learning, Bagging, Boosting, Random Forest	8	Understand (U)
2	Kernel Methods for non-linear data, Support Vector Machines, Kernel Ridge Regression, Structure Kernels, Kernel PCA, Latent Semantic Analysis	8	Apply(A)
3	Bayesian methods for using prior knowledge and data, Bayesian inference, Bayesian Belief Networks and Graphical models, Probabilistic Latent Semantic Analysis, The Expectation-Maximization (EM) algorithm, Gaussian Processes.	8	Analyze (AN)
4	Dimensionality Reduction - CCA, LDA, ICA, NMF - Canonical Variates - Feature Selection vs Feature Extraction	10	Evaluate (E)
5	Filter Methods - Sub-space approaches - Embedded methods Low-Rank approaches - Recommender Systems .Application areas - Security - Business - Scientific	9	Evaluate (E)
6	Recent trends in supervised and unsupervised learning algorithm, dimensional reducibility, feature selection and extraction	5	Understand (U)

Reference Books:

1. Christopher M. Bishop, Pattern Recognition and Machine Learning.
2. John Shawe-Taylor and Nello Cristianini, Kernel Methods for Pattern Analysis. B., 1999.

M.E. Semester –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="3">SEM : II</td></tr>
<tr><td colspan="7">Course Name :English for research paper writing</td><td colspan="3">Course Code :AC-CSME001</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (50)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">50</td></tr>
<tr><td>2</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>50</td></tr>
<tr><td colspan="10">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%)</td></tr>
</table>

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 Dordrecht Heidelberg London, 2011

M.E. Semester –II

ME (Computer Engineering)									**SEM :** II
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**	**50**
2	-	-	2	-	-	-	-	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 "'New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., "Disaster Administration And Management Text And Case Studies ",Deep & Deep Publication Pvt. Ltd., New Delhi

M.E. Semester –II

ME (Computer Engineering)							**SEM:** II		
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 per Bloom's Taxonomy
1	Understanding basic Sanskrit language	Understand (U)
2	Ancient Sanskrit literature about science & technology can be understood	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" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

M.E. Semester –II

ME (Computer Engineering)									
Course Name : Value Education						**SEM :** II **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**	50
2	-	-	2	-	–	–	–	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 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 –II

<table>
<tr><td colspan="7">ME (Computer Engineering)</td><td colspan="3">SEM: II</td></tr>
<tr><td colspan="7">Course Name: Constitution of India</td><td colspan="3">Course Code:AC-CSME005</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Practical/Oral (25)</td><td>Term Work (50)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">50</td></tr>
<tr><td>2</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>50</td></tr>
<tr><td colspan="10">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%)</td></tr>
</table>

Course objectives:

1. Understand the premises informing the twin themes of liberty and freedom from a civil right perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
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: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: 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 –II

ME (Computer Engineering)									**SEM:** II
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**	**50**
2	-	-	2	-	-	-	-	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:

Module No.	Topics	Hrs.	Cognitive levels as per Bloom'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 of pranayam	8	Apply (A)

Reference Books:

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

M.E. Semester –II

ME (Computer Engineering)									**SEM :** II
Course Name : Laboratory III (Based on cores)							**Course Code:**LC-CSME202		
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**	**50**
-	-	4	4	2	-	-	25	25	
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Assignment (40%) and Attendance (20%)									
Prerequisite: Advanced Algorithm, Soft Computing									

List of Practical/ Experiments:

S.N.	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels as per Blooms Taxonomy
1	**Basic Experiments**	Experiment Dijkstra's algorithm to find shortest path	2	Apply (A)
2		Experiment Graph matching algorithm to compute maximum matching	2	Apply (A)
3		Experiment Strassen's algorithm for Matrix computation	2	Apply (A)
4		Experiment Chinese Remainder theorem on integers / polynomials	2	Apply (A)
5		Implement Approximation algorithms	2	Apply (A)
6	**Design Experiments**	Design a Fuzzy Inference System in Python	4	Create (C)
7		Design Supervised Learning Neural Network	4	Create (C)
8		Design UnSupervised Learning Neural Network	4	Create (C)
9		Design Genetic Algorithm for Machine Learning Task	4	Create (C)
10		Design Deep Learning Network for classification task	4	Create (C)

M.E. Semester –II

ME (Computer Engineering)							**SEM:** II		
Course Name: Laboratory IV							**Course Code:**LC-CSME202		
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**
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 –II

<table>
<tr><th colspan="7">ME (Computer Engineering)</th><th colspan="3">SEM: II</th></tr>
<tr><td colspan="7">Course Name: Mini Project with Seminar</td><td colspan="3">Course Code: LC-CSME203</td></tr>
<tr><td colspan="5">Teaching Scheme (Program Specific)</td><td colspan="5">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="5">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="1">Hours Per Week</td><td colspan="2">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>IA</td><td>ESE</td><td>PR/OR</td><td>TW</td><td rowspan="2">50</td></tr>
<tr><td>-</td><td>-</td><td>4</td><td>4</td><td>2</td><td>-</td><td>-</td><td>50</td><td>-</td></tr>
<tr><td colspan="10">The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of Practical (40%) and Attendance (20%)</td></tr>
</table>

- Mini Project will be done by an individual student.
- Individual student has to present a seminar on Emerging trends with respect to domain, tools, products and research
- Study report, Case studies, white papers and research papers needs to be submitted based on the selected technologies.
    1. Autonomous things
    2. Augmented analytics
    3. AI-driven development
    4. Digital twins
    5. Empowered edge
    6. Immersive technologies
    7. Block chain
    8. Smart spaces
    9. Digital ethics and privacy
    10. Quantum computing, etc.

M.E. Semester –II

ME (Computer Engineering)							**SEM:** II		
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: 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 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. Shrimad Bhagwad Geeta : 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. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	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.