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Semester VIII

Semester VIII (SCHEME A)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme			Credits
				L	T	P	
1.	PEC	CL05	Elective-V	3	–	–	3
2.	PEC	CL06	Elective-VI	3	–	–	3
3.	IOC	-	Inter-Disciplinary Open Course - II	3	–	–	3
4.	PROJ	CL07	Project -IV	–	–	12	6
5.	PROJ	CL08	Seminar-II	–	–	2	1
Total Academic Engagement and Credits				9	0	14	16
				23			

Semester VIII (SCHEME B)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme			Credits
				L	T	P	
1.	PEC	CL05	Elective-V	3	–	–	3
2.	PEC	CL06	Elective-VI	3	–	-	3
3.	IOC	-	Inter-Disciplinary open Course -II	3	–	–	3
4.	PROJ	CL07	Project /Internship (Industry/Corporate/Academia)	–	–	12	6
5.	PROJ	CL08	Seminar-II	–	–	2	1
Total Academic Engagement and Credits				9	0	14	16
				23			

Note:

- In the Eighth Semester, students may opt for 'SCHEME A' or 'SCHEME B'

Electives-V	Electives-VI	Inter-disciplinary open Course -II
(A) Metaheuristic Algorithms	(A) Big Data& Hadoop	CS01Digital Marketing & SEO
(B) Digital Image Processing	(B) Knowledge Management	FT (B) Occupation Health and First Aid
(C) Quantum Computing	(C) Web & Information Retrieval	Green Technology
(D) Augmented & Virtual Reality	(D) Data Visualization	Industrial Electronics

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PEC-CL05(A)	Metaheuristic Algorithms	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite: Numerical Calculus.

Course Objective:

The course aims to give an overview of modern metaheuristic optimization methods that are suitable for solving practical optimization problems.

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

Introduction to Metaheuristic Algorithms Overview of Metaheuristic Algorithms: Definition and characteristics of metaheuristic algorithms, Importance and applications in optimization problems.

Classification of Metaheuristic Algorithms: Nature-inspired vs. population-based algorithms, Exploration vs. exploitation trade-off.

Module 2: **(08 hrs.)**

Evolutionary Algorithms Genetic Algorithms: Basic principles and operators (selection, crossover, mutation), Applications in optimization problems (e.g., scheduling, routing).

Module 3: **(06 hrs.)**

Swarm Intelligence Algorithms Particle Swarm Optimization (PSO): Concepts of particles, velocity, and position updates, Applications in continuous optimization and neural network training.

Module 4: **(08 hrs.)**

Ant Colony Optimization (ACO) and Other Algorithms Ant Colony Optimization: Principles inspired by ant foraging behavior, Applications in combinatorial optimization (e.g., TSP, graph coloring). Other Metaheuristic Algorithms: Tabu Search, Simulated Annealing, Harmony Search, Overview of principles, exploration, and exploitation mechanisms.

(10 hrs.)

Module 5:

Hybrid and Advanced Metaheuristic Algorithms Hybrid Metaheuristic Algorithms: Integration of metaheuristics with local search methods, Examples and benefits of hybrid approaches in solving complex problems.

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Course Outcomes:

1. Understand the basics of metaheuristic techniques.
2. Apply local and global search metaheuristic algorithms for solving optimization problems.
3. Implement and validate a computational model based on evolutionary algorithms.
4. Adopt different nature based metaheuristic algorithms for solving optimization problems.
5. Analyse metaheuristic algorithms for solving multi-objective, multi-modal and dynamic optimization problems.

List of Text / Reference Books:

1. Shneiderman, Plaisant, Cohen and Jacobs, “Designing the User Interface: Strategies for Effective Human Computer Interaction”, 5th Edition, Pearson.
2. John M. Carrol, “Human Computer Interaction in the New Millennium”, Pearson.
3. Helen Sharp, Jennifer Preece, Yvonne Rogers, “Interaction Design: Beyond Human-Computer Interaction”, 5th Edition, Wiley.
4. Dan Diaper, Neville Stanton, “The Handbook of Task Analysis for Human-Computer Interaction”, CRC Press.
5. Jakob Nielsen, Hoa Loranger, “Prioritizing Web Usability”, New Riders.

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PEC-CL05(B)	Digital Image Processing	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite(s): basic knowledge in mathematics and partial differential equation.

Course Objectives:

Understand and implement algorithms for basic and advanced image processing tasks, including noise removal, enhancement, compression, segmentation, and performance assessment.

Course Contents: (40 Hours)

Module 1: **(06 hrs)**

Digital Image fundamentals, a simple image model, Sampling and Quantization. Relationship between pixels, Imaging geometry, Image acquisition systems, Different types of digital images

Module 2: **(08 hrs)**

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine transformation

Module 3: **(08 hrs)**

Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering.

Module 4: **(10 hrs)**

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder, Error free compression, Lossy Compression schemes. JPEG Compression standard, Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

Module 5: **(08 hrs)**

Mathematical morphology- Binary, Dilation, crosses, Opening and closing, simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation

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Course Outcomes:

After completion of the course the student will be able to

1. State the Image representation and modeling.
2. Describe the various Fourier transformation techniques.
3. Identify the various Image enhancements and filter techniques.
4. Recognize the Image encoding and segmentation techniques

Recommended Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab – TMH. Inc.
2. Sonka, Digital Image Processing & Computer Vision, Cengage Learning
3. Jayaraman Digital Image Processing, TMH.

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Semester VIII

PEC-CL05(C)	Quantum Computing	3L: 0T:0P	Credits:03

Prerequisite: Data Science, Maths and Physics.

Course Objective:

Objective of the course: The objective of this course is to provide the students an introduction to quantum computation. Students understand the concept of Entanglement, Quantum Computer, and Quantum Algorithm**.**

Course Contents: (40 Hours)

Module 1: **(06 hrs)**

Introduction to quantum mechanics: Postulates of quantum mechanics, Qubit and quantum states, Vector Spaces, Single Qubit Gates, multiple Qubit Gates, Controlled Gates, Composite Gates, Matrices and operators.

Module 2: **(08 hrs)**

Density operators: Density Operator for a Pure State, Density Operator for a Mixed State, Properties of a Density Operator, Characterizing Mixed States, Completely Mixed States, Partial Trace and Reduced Density Operator. Quantum measurement theory: Distinguishing Quantum States and Measurement, Projective Measurements, Measurements on Composite Systems, Generalized Measurements, Positive Operator Valued Measures.

Module 3: **(08 hrs)**

Entanglement: Quantum state entanglement ,Bell's Theorem, The Pauli Representation, Using Bell States For Density Operator Representation, Quantum gates and circuits: Single Qubit Gates, The Z Y Decomposition ,Basic Quantum Circuit Diagrams, Controlled Gates, Application of Entanglement in teleportation and supper dense coding., Distributed quantum communication Quantum Computer: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

Module 4: **(08 hrs)**

Quantum Algorithm: Hadamard Gates, The Phase Gate, Matrix Representation of Serial and Parallel Operations, Quantum Interference, Quantum Parallelism and Function Evaluation, Deutsch -Jozsa Algorithm, Quantum Fourier Transform, Phase Estimation, Shor's Algorithm, Quantum Searching and Grover's Algorithm

Module 5: **(10 hrs)**

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information – ShannonEntropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

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Semester VIII

Course Outcomes:

1. Students would learn the framework of quantum computation, and how that may be useful for future quantum technologies.
2. The students learn concept of Density Operation and Quantum measurement theory.
3. Understand the main concepts Entanglement and basic of Quantum Computer
4. Design and understand the concept of computer algorithm.
5. Ability to understand and Quantum Error Correction.

List of Text Books/ Reference Books:

1. Quantum Computing Explained: David McMahon, Wiley Interscience (IEEE Computer Science).
2. Quantum Computing without Magic Devices : Zdzislaw Meglicki; PHI
3. Quantum Computation and Quantum Information: M.A. Nielsen & Isaac L. Chuang, CambridgeUniversity Press
4. Quantum Computing and communications: An Engineering Approach: Sandor Imre and FerencBalazs, Wiley.

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Semester VIII

PEC-CL05(D)	Augmented & Virtual Reality	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite: NA

Course Objective: The objective of this course is to explore the concepts of Virtual reality and develop 3D virtual environment.

Course Contents: (40 Hours)

Module 1: **(06 hrs)**

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Multiple Modals of Input and Output Interface in Virtual Reality: Input -Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output - Visual / Auditory / Haptic Devices.

Module 2: **(10 hrs)**

Visual Computation in Virtual Reality**:** Fundamentals of Computer Graphics Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large-Scale Environments& Real Time Rendering.

Module 3: **(08 hrs)**

Environment Modeling in Virtual Reality Geometric Modeling, Behavior Simulation, Physically Based Simulation Interactive Techniques in Virtual Reality**:** Body Track, Hand Gesture 3D Manus, Object Grasp.

Module 4: **(10 hrs)**

Introduction of Augmented Reality (AR): System Structure of Augmented Reality. Key Technology in AR. Development Tools, and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR X3D Standard: Vega, MultiGen Virtools.

Module 5: **(06 hrs)**

Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR, VR Development Tools Frameworks of Software Development Tools in VR, Modeling Tools for VR, X3D Standard; Vega, MultiGen, Virtools.

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Semester VIII

Course Outcomes:

1. Describe how VR systems work and list the applications of VR.
2. Understand the design and implementation of the hardware that enables the development of VR systems.
3. Understand the system of human vision and its implication on perception and rendering.
4. Explain the concepts of motion and tracking in VR systems and basic concept of AR.
5. Describe the importance of interaction and audio in VR systems.

List of Text Books / Reference Books:

1. Burdea G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley- IEEE Press.
2. Sherman, William R. and Alan B. Craig. Understanding Virtual Reality – Interface, Application, and Design, Morgan Kaufmann.
3. Fei GAO., Design and Development of Virtual Reality Application System, Tsinghua Press.

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Semester VIII

PEC CL06(A)	Big Data &Hadoop	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite(s): Cloud Computing

Course Objectives:

Understand the various parts of Hadoop condition, for instance, Hadoop 2.7, Impala, Yarn, MapReduce, Pig, Hive, HBase, Sqoop, Flume, and Apache Spark. Learn Hadoop Distributed File System (HDFS) and YARN building and make sense of how to function with them for limit and resource organization.

Course Contents: (36 Hours)

Module 1: **(06 hrs)**

Introduction to BigData Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

Module 2: **(08 hrs)**

Need of Hadoop, Data centers and Hadoop Cluster overview, Overview of Hadoop Daemons, Hadoop Cluster and Racks, Learning Linux required for Hadoop, Hadoop ecosystem tools overview, Big data Hadoop opportunities

Module 3: **(08 hrs)**

HDFS Daemons – Namenode, Datanode, Secondary Namenode, Hadoop FS and Processing Environment's UIs,Fault Tolerant, High Availability, Block Replication, Hadoop Processing Framework: YARN Daemons – Resource Manager, NodeManager, Job assignment & Execution flow, MapReduce Architecture, MapReduce life cycle, Word Count Example(or) Election Vote.

Module 4: **(08 hrs)**

Introducing Hadoop Hive, Detailed architecture of Hive, Comparing Hive with Pig and RDBMS, Working with Hive Query Language, Creation of a database, table, group by and other clauses, Various types of Hive tables, HCatalog, Storing the Hive Results, Hive partitioning, and Buckets

Module 5: **(06 hrs)**

Introduction to Hadoop Framework: Spark and Scala, Apache Pig: Advantage of Pig over MapReduce, Pig vs Hive Use case, Introduction to HBASE, Fundamentals of HBase, SQL vs. NOSQL, Application of Sqoop, Flume, Oozie

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Semester VIII

Course Outcomes:

After completion of the course the student will be able to:

1. Explain the statistics of Big Data.
2. Identify Hadoop EcoSystem.
3. Understand HDFS and the Mapreduce algorithm.
4. Articulate innovative insights of Hive.
5. Identify and utilize various Hadoop tools.

Recommended Books:

1. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to data Science and its Applications”, Wiley publications
2. Radha Shankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition
3. Seema Acharya, Subhashini Chellappan, " Big Data and Analytics", Wiley, First edition

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Semester VIII

PEC-CL06(B)	Knowledge Management	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite: NA

Course Objective:

Understand the concepts of Knowledge Management, the challenges in Knowledge-Based Organizations, and the role of autonomy and accountability in managing them effectively.

Course Contents: (40 Hours)

Module 1: **(08 hrs)**

Introduction to Knowledge Management- Knowledge Society- Types of Knowledge- An Introduction to life in organizations- Concept and Characteristics of KBOs- Dimensions of HRM in KBOs- New Roleand Challenges for HRM in the KBOs.

Module 2: **(10 hrs)**

Managing Knowledge for organizational effectiveness- Process and Methods- Concept of Intellectual Capital and Learning Orientation in the Organizations- Knowledge and Role related issues- Performance Appraisal in a KBO- Intellectual Property Rights (IPR).

Module 3: **(08 hrs)**

Managing Knowledge and Personnel & Organizational Health- Rewarding Knowledge Management of Retention.

Module 4: **(06 hrs)**

ICTs in KBOs- HRIS for KBOs- Concept, Mechanisms, and Software Orientation Performance Management– Mechanisms.

Module 5: **(08 hrs)**

Technologies to Manage Knowledge– Artificial Intelligence– Digital Libraries – Repositories– Knowledge Discovery– Creating Systems that Utilize Knowledge- Knowledge Process Outsourcing- Innovation Clusters.

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Semester VIII

Course Outcomes:

1. Analyze personal and organizational situations in terms of theories of knowledge.
2. Analyze the knowledge needs of an organizational situation.
3. Select and apply appropriate systems components and design a knowledge management system.
4. Critique different forms of knowledge considering current research.
5. Explore and Contribute to Innovation Clusters.

List of Text/ Reference Books:

1. Frances Horibe, Managing Knowledge Workers, John Wiley & Sons.
2. Ganesh Natarajan and Sandhya Shekhar, Knowledge Management- Enabling Business Growth, Tata McGraw-Hill, New Delhi.
3. Fernandez & Leidner, Knowledge Management, PHI Learning, New Delhi.
4. Mruthyunjaya, Knowledge Management, PHI Learning, New Delhi.

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Semester VIII

PEC-CL06(C)	Web & Information Retrieval	3L: 0T:0P (3hrs.)	Credits:03

Pre requisite(s): Data Mining, Data Structure and Algorithms

Course Objectives:

Explore the scientific principles of information search and retrieval, focusing on retrieval models, hypermedia architectures, and semantic models.

Course Contents: (30 hrs.)

Module 1: **(06 hrs.)**

Introduction to Information Retrieval, Retrieval strategies: vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language models.

Module 2: **(06 hrs.)**

Retrieval Utilities: Relevance feedback, clustering, N-grams, Regression analysis, Thesauri

Module 3: **(06 hrs.)**

Retrieval utilities: Semantic networks, parsing, Cross–Language: Information Retrieval: Introduction, Crossing the Language barrier.

Module 4: **(04 hrs.)**

Efficiency: Inverted Index, Query processing, Signature files, Duplicate document detection.

Module 5: **(08 hrs.)**

Integrating structured data and text: A historical progression, Information retrieval as relational application, Semi Structured search using a relational schema, Distributed Information Retrieval: A theoretical Model of Distributed retrieval, web search

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Semester VIII

Course Outcome:

1. Understanding information retrieval strategies with examples.
2. Knowledge gathering about Retrieval Utilities and relevance feedback.
3. Applying and examine case studies.
4. Understanding concept of query processing.
5. Knowledge gathering about integrated structure data, text and models.

List of Text / Reference Books:

1. David A. Grossman, OphirFrieder, "Information Retrieval – Algorithms and Heuristics", Springer, 2ndEdition(Distributed by Universal Press), 2004
2. Gerald J Kowalski, Mark T Maybury, "Information Storage and Retrieval Systems: Theory andImplementation", Springer, 2004.
3. Soumen Chakrabarti, "Mining the Web: Discovering Knowledge from Hypertext Data, Morgan",Kaufmann Publishers, 2002.
4. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, "An Introduction to Information Retrieval," Cambridge University Press.

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Semester VIII

PEC-CL06(D)	Data Visualization	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite: Nil

Course Objective:

To understand the various types of data, apply and evaluate the principles of data visualization. Acquire skills to apply visualization techniques to a problem and its associated dataset. To apply structured approach to create effective visualizations thereby building visualization

Course Content: (40 Hours)

Module 1: **(08 hrs.)**

Introduction to Data Visualization Overview of data visualization, Data Types and Their Characteristics, Data Abstraction- Analysis: Four Levels for Validation- Task Abstraction - Analysis: Four Levels for Validation.

Module 2: **(10 hrs.)**

Visualization Techniques Scalar and point techniques, Geospatial Visualization, Network and Hierarchical Visualizations, Color maps Contouring Height Plots - Vectorvisualization techniques Vector properties Vector Glyphs Vector Color Coding Stream Objects.

Module 3: **(10 hrs.)**

Visual Analytics Visual Variables- Networks and Trees - Map Color and Other Channels- Manipulate View,Arrange Tables Geo Spatial data Reduce Items and Attributes.

Module 4: **(06 hrs.)**

Visualization Tools and Techniques Introduction to data visualization tools- Tableau - Visualization using R. Big Data Visualization Challenges, AI and Machine Learning in Visualization. Immersive Analytics (AR/VR in Visualization)

Module 5: **(06 hrs.)**

Diverse Types of Visual Analysis Time- Series data visualization Text data visualization Multivariate data visualization and case studies. Dashboard creation using visualization tools for the use cases: Finance-marketing-insurance healthcare etc.

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Semester VIII

Course Outcomes:

1. Explain the fundamental concepts of data types, abstraction, and task analysis in data visualization.
2. Apply appropriate scalar, vector, geospatial, and hierarchical visualization techniques to represent various data forms.
3. Analyze complex data structures using visual variables, layout manipulations, and geospatial reduction techniques.
4. Evaluate and utilize advanced data visualization tools like Tableau and R, integrating AI/ML methods and immersive technologies.
5. Create interactive dashboards by visualizing multivariate, text, and time-series data for domain-specific use cases.

List of Text Books/ Reference Books:

1. Tamara Munzer, Visualization Analysis and Design, CRC Press.
2. AlexandruTelea, Data Visualization Principles and Practice CRC Press.
3. Paul J. Deitel, Harvey Deitel, Java SE8 for Programmers (Deitel Developer Series) 3rd Edition.
4. Y. Daniel Liang, Introduction to Java programming-comprehensive version-Tenth Edition, Pearson ltd.
5. Paul Deitel Harvey Deitel ,Java, How to Program, Prentice Hall; 9th edition.
6. Cay Horstmann BIG JAVA, 4th edition,John Wiley Sons.
7. Nicholas S. Williams, Professional Java for Web Applications, Wrox Press.

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IOC-CS01	Digital Marketing and SEO	3L: 0T:0P (3hrs.)	Credits:03

Prerequisite(s): NIL

Course Objectives:

Gain a comprehensive understanding of key digital marketing platforms and strategies, including analytics, SEO, social media, PPC, email, mobile, and content marketing.

Course Contents: (40 Hours)

Module 1: **(06 hrs)**

Digital Marketing: Introduction, Moving from Traditional to Digital Marketing, Integrating Traditional and Digital Marketing, Reasons for Growth. Need for a comprehensive Digital Marketing Strategy.Concepts: Search Engine Optimization (SEO); Concept of Pay Per Click

Module 2: **(08 hrs)**

Social Media Marketing: Introduction, Process - Goals, Channels, Implementation, Analyze Tools: Google and the Search Engine, Face book, Twitter, YouTube and LinkedIn, Issues: Credibility, Fake News, Paid Influencers, Social Media and Hate/ Phobic campaigns, Analytics and linkage with Social Media, The Social Community.

Module 3: **(10 hrs)**

Email Marketing: Introduction, email marketing process, design and content, delivery, discovery. Mobile Marketing: Introduction and concept, Process of mobile marketing: goals, setup, monitor, analyze; Enhancing Digital Experiences with Mobile Apps. Pros and Cons; Targeted advertising. Issues: Data Collection, Privacy, Data Mining, Money and Apps, Security, Spam. Growth Areas.

Module 4: **(06 hrs)**

Managing Digital Marketing: Content Production; Video based marketing; Credibility and Digital Marketing; IoT; User Experience; Future of Digital Marketing.

Module 5: **(10 hrs)**

SEO Analytics, Monitoring & Reporting: Google Search Console (GSC), Key Sections & Features of GSC; How to monitor SEO progress with Key Features of GSC: Overview, Performance, URL Inspection, Coverage, Sitemaps, Speed, Mobile Usability, Backlinks, Referring Domains, Security & Manual Actions, How to do SEO Reporting

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Semester VIII

Course Outcomes:

After completion of the course the student will be able to

1. Understand the concept of digital marketing and its real-world iterations.
2. Articulate innovative insights of digital marketing enabling a competitive edge.
3. Understand how to create and run digital media-based campaigns.
4. Identify and utilize various tools such as social media etc
5. Understand how to do SEO Audit

Recommended Books:

1. Dodson, Ian: The Art of Digital Marketing - The Definitive Guide to Creating Strategi Targeted and Measurable Online Campaigns. Wiley
2. Ryan, Damien: Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation. Kogan Page Limited.
3. Gupta, Sunil: Driving Digital Strategy. Harvard Business Review Press.
4. Tuten, Tracy L. and Solomon, Michael R.: Social Media Marketing. Sage.
5. Bhatia, Puneet S.: Fundamentals of Digital Marketing. Pearson.
6. Kotler, Philip: Marketing 4.0: Moving from Traditional to Digital. Wiley.

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Semester VIII

PROJ CL07	Project-IV	0L: 0T:12P	Credits:06

Course Objective:

1. To enable students to formulate a relevant research or practical problem in the domain of Computer Science and AI/ML.
2. To apply computational thinking and AI/ML methodologies in developing effective and innovative solutions.
3. To foster critical thinking through model analysis, validation, and benchmarking of results.
4. To enhance professional communication through report writing, technical documentation, and oral presentations.

Module 1:

This module focuses on identifying a research gap or application domain problem in computer science or AI/ML. Students will conduct a systematic literature survey using reputed digital libraries (IEEE, ACM, etc.) and formalize a research question with clear objectives, scope, and constraints. Emphasis is placed on ethical AI considerations and feasibility assessment.

Module 2:

Students will explore AI/ML algorithms or general computational methods relevant to their chosen problem. This phase includes choosing appropriate models, tools, datasets, and defining the experimental setup. Design decisions must align with ethical and efficiency standards.

Module 3:

This module involves the actual coding, model training, system building, or simulation, depending on the nature of the project. Students will apply frameworks such as Python, TensorFlow, PyTorch, Scikit-learn, or other tools based on project needs.

Module 4:

Students will evaluate the performance of the solution using metrics like accuracy, precision, recall, F1-score, or computational efficiency. This module includes comparison with baseline or existing methods and identifying areas for improvement.

Module 5:

The final module covers structured technical report writing and the preparation of effective oral and visual presentations. Students will document their work in formats such as IEEE paper or project report templates and present their findings to faculty panels.

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Semester VIII

Course Outcomes:

After completion of the course the student will be able to

1. Students will be able to identify, review, and formulate a meaningful problem statement backed by existing literature.
2. Students will be able to design an appropriate solution architecture and select suitable algorithms, tools, and datasets for implementation.
3. Students will be able to develop, implement, and test the proposed solution or model using real or synthetic data.
4. Students will be able to analyze, validate, and compare their results with established benchmarks or models.
5. Students will be able to compose a technical report and present their work clearly and effectively to both technical and non-technical audiences.

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PROJ CL08	Seminar-II	0L: 0T:2P	Credits:01

Course Objective:

To develop students' ability to explore, analyze, and effectively communicate technical topics in Computer Science and AI/ML through research and presentations.

The seminar course starts with the students choosing a pertinent and current topic from the areas of Computer Science or Artificial Intelligence & Machine Learning, and preparing a brief proposal that defines the scope and relevance of the topic. They then perform a systematic literature review based on scholarly sources to highlight key advancements, challenges, and research trends. On the basis of their research, students draft a nicely formatted technical report in proper citations and scholarly writing standards. Focus is then directed toward presentation skills development, such as good slide organization, content organization, and delivery. The course ends with each student making a formal seminar presentation, followed by a question-and-answer session, enabling them to prove subject mastery, communication clarity, and confidence.

Course Outcomes:

After completion of the course the student will be able to

1. Identify and select a relevant topic in Computer Science or AI/ML for seminar presentation.
2. Conduct a thorough literature review and synthesize key findings from credible sources.
3. Write a structured technical report with clarity and proper referencing.
4. Prepare and design visually effective and logically organized presentation materials.
5. Deliver a confident, professional seminar and respond effectively to audience questions.