VII Semester

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		Total
			L	T	P		Continual Assessment	End Sem Examination	
1	22AI701T	Expert Systems in Artificial Intelligence	3		-	3	30	70	100
2	22AI702P	Software Lab - II	-	-	2	1	25	25	50
3	22AI703T	Professional Elective - IV	3	-	-	3	30	70	100
4	22AI703P	Professional Elective - IV Lab	-	-	2	1	25	25	50
5	22AI704T	Professional Elective - V	3		-	3	30	70	100
6	22AI761O	Open Elective - III	3	-	-	3	30	70	100
7	22AI705P	Project – II	-	-	8	4	50	50	100
8	22AI706P	Summer / Winter Internship *	-	-	-	2	50	-	50
9	22AI707P	Capstone Course – II **	-	-	2	1	50	-	50
Total			**12**	**0**	**14**	**21**	**320**	**380**	**700**

*** Summer / Winter Internship (Evaluation of Four weeks Internship Completion till 6th Semester)**
**** Capstone Course – II (Comprehensive knowledge gained in Artificial Intelligence)**

22AI703T	**Professional Elective - IV**	22AI703P	**Professional Elective – IV Lab**
22AI703T(i)	Augmented Reality & Virtual Reality	22AI703P(i)	Augmented Reality & Virtual Reality Lab
22AI703T(ii)	Information Retrieval	22AI703P(ii)	Information Retrieval Lab
22AI703T(iii)	Computer Vision	22AI703P(iii)	Computer Vision Lab

22AI704T	**Professional Elective - V**	22AI761O	**Open Elective III**
22AI704T(i)	AI in Health care	22AI761O(i)	Introduction to Cloud Computing with ML
22AI704T(ii)	AI in Finance	22AI761O(ii)	Ethical Hacking
22AI704T(iii)	AI in Agriculture		

Artificial Intelligence

SEVEN SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI701T	Expert Systems in Artificial Intelligence	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended to • Learn the basics of an expert system. • Gain knowledge about implementation ofan expert system.	**Students will be able to** • Interpret the basics of the expert system. • Learn theoretical foundation of expert system. • Distinguish the various types of expert systems. • Comprehend the various components of an expert system. • Develop the expert system.

Unit I: Introduction to Expert Systems	**[9Hrs]**
The nature of Expert Systems Types of applications of Expert Systems relationship of Expert Systems to Artificial Intelligence and to Knowledge-Based Systems. The nature of expertise Distinguishing features of Expert Systems. Benefits of using an Expert System Choosing an application.	
Unit II: Inference in ES	**[8Hrs]**
Theoretical Foundations What an expert system is; how it works and how it is built. Basic forms of inference: abduction; Deduction; induction.	
Unit III: Knowledge base in ES	**[10Hrs]**
The representation and manipulation of knowledge in a computer; Rule-based representations (with backward and forward reasoning); logic-based representations (with resolution refutation); taxonomies; meronomies; frames (with inheritance and exceptions); semantic and partitioned nets (query handling).	
Unit IV: Development of ES	**[9Hrs]**
Basic components of an expert system; Generation of explanations; Handling of uncertainties; Truth Maintenance Systems; Expert System Architectures; An analysis of some classic expert systems; Limitations of first generation expert systems; Deep expert systems; Co-operating expert systems and the blackboard model.	
Unit V: Representation and evaluation	**[9Hrs]**
Building Expert Systems Methodologies for building expert systems: knowledge acquisition and elicitation; formalization; representation and evaluation. Knowledge Engineering tools, Case Study.	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Introduction to Expert Systems	P Jackson	2nd	Addison Wesley.
2	Artificial Intelligence	Elaine Rich, Kevin Knight	2nd	McGraw-Hill, Inc.

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Problem Solving and Artificial Intelligence	Jean-Louis Lauriere	3rd	Prentice Hall.

SEVEN SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI702P	Software Lab - 2 (Emerging Technology Laboratory)	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended to • Analyze linguistic data using advanced computational methods effectively. • Apply theoretical concepts to practical language research experiments.	**Students will be able to** • Analyze linguistic data using computational tools effectively. • Design and conduct language research experiments proficiently. • Apply theoretical concepts to practical linguistic scenarios. • Evaluate linguistic theories through empirical data analysis. • Communication research finding clearly in written and oral form.

Sr. No.	List of Practicals
1	Basic Arithmetic Operations
2	Matrix Manipulation
3	Plotting Functions
4	Linear Regression
5	Image Processing Basics
6	Basic Neural Network Implementation
7	Basic Image Filtering
8	Text Processing
9	Micro based Project based on studied syllabus
Open ended practical	
10	Phonetic Anaysis of Volwel Sound.
11	Symentic tree Constraction.

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Hands-On Large Language Models	Jay Alammar & Maarten Grootendorst	1st	O'Reilly Media
2	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow	Aurelien Geron	3rd	O'Reilly Media

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Quick start Guide to Large Language Models	SINAN OZEMIR	1st	Addison-Wesley

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI703T(iii)	PE-IV Computer Vision	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended to • Review image processing techniques for computer vision. • Apply various features and recognition techniques of computer vision. • Learn about histogram and binary vision.	**Students will be able to** • Learn low level processing of image and transformation techniques applied to images. • Adapt the feature extraction, segmentation and object recognition methods. • Apply Histogram transform for detection of geometric shapes like line, ellipse and objects. • Illustrate 3D vision process and motion estimation techniques. • Apply vision techniques to real time applications.

Unit I Introduction	**[9 Hrs]**
Image Processing, Computer Vision - Low-level, Mid-level, High-level; Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.	
Unit II Feature Extraction and Feature Segmentation	**[10 Hrs]**
Feature Extraction -Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space 69 Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT. Image Segmentation -Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation.	
Unit III Images, Histograms, Binary Vision	**[8Hrs]**
Simple pinhole camera model – Sampling – Quantisation – Colour images – Noise – Smoothing – 1D and 3D histograms - Histogram/Image Equalisation - Histogram Comparison - Back-projection - k-means Clustering – Thresholding - Threshold Detection Methods - Variations on Thresholding - Mathematical Morphology – Connectivity.	
Unit IV 3D Vision And Motion	**[10 Hrs]**
Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion–spline- based motion- optical flow – layered motion.	
Unit V Applications	**[8 Hrs]**
Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing , Application based on Deep Learning for computer vision.	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Computer Vision: A Modern Approach"	D. A. Forsyth, J. Ponce,	2nd	Pearson Education
2	Computer Vision: Algorithms and Applications	Richard Szeliski	2nd	Springer Verlag London Limited

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Computer Vision: Models, Learning, and Inference	Simon J. D. Prince	2nd	Cambridge University
2	Feature Extraction & Image Processing for Computer Vision,	Mark Nixon and Alberto S. Aquado	3rd	Academic Press
3	Computer & Machine Vision	E. R. Davies	4th	Academic Press

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI703P(iii)	PE-IV Computer Vision Laboratory	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended to • Learn basic knowledge and theories in image processing and computer vision. • Implement basic and some advanced image processing techniques in OpenCV. • Evaluate Image segmentation, camera calibration and 3D reconstruction.	**Students will be able to** • Implement the basic knowledge, theories and methods in image processing and computer vision. • Adapt basic and some advanced image processing techniques in OpenCV. • Analyze 2D a feature-based based image alignment, segmentation, and motion estimations. • Apply 3D image reconstruction techniques. • Design and develop innovative image processing and computer vision applications.

Sr. No.	List of Practical
1	OpenCV Installation and working with Python
2	Basic Image Processing - loading images, Cropping, Resizing, Thresholding, Contour· analysis, Bolb detection
3	Image Annotation – Drawing lines, text circle, rectangle, ellipse on images
4	Image Enhancement - Understanding Color spaces, color space conversion
5	Histogram equalization, Convolution, Image smoothing, Gradients, Edge Detection
6	Image Features and Image Alignment – Image transforms – Fourier, Hough,Extract· ORB Image features, Feature matching, cloning, Feature matching-based image Alignment
7	Image segmentation using Graphcut / Grabcut
8	Camera Calibration with circular grid, Pose Estimation·
9	Lab based on libraries supported for computer vision such as PyTorch and Fast AI.
10	Micro Project
Open Ended Practical	
11	Object Detection and Tracking using Kalman Filter, Camshift· docs. OpenCV
12	OpenCV/OpenCV-free-course

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Computer Vision: Algorithms and Applications	Richard Szeliski	2nd	Springer Verlag London Limited.
2	Computer Vision: A Modern Approach	D. A. Forsyth, J. Ponce	2nd	Pearson Education

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Computer Vision: Models, Learning, and Inference	Simon J. D. Prince	2nd	Cambridge University

SEVENTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI704T (ii)	PE-V AI in Finance	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended to ● Comprehensive understanding of how artificial intelligence (AI) is revolutionizing the field of finance ● Focusing on the application of AI techniques to various financial tasks such as investment management, risk assessment, trading strategies, and fraud detection.	**Students will be able to** ● Learn basic concepts and applications of artificial intelligence in finance. ● Build machine learning algorithms and their applications in financial analysis. ● Apply practical skills in implementing AI techniques for financial modeling and prediction. ● Evaluate the impact of AI on financial markets and regulatory challenges. ● Explore ethical considerations and societal implications of AI-driven finance.

Unit I Introduction to Artificial Intelligence in Finance	**[9Hrs]**
Overview of financial markets, instruments, and institutions, Introduction to artificial intelligence and machine learning, · Historical developments and recent trends, Applications of AI in finance: overview and potential impact, Ethical considerations and challenges in applying AI to finance.	
Unit II Data Preprocessing and Feature Engineering	**[9Hrs]**
Data collection and cleaning techniques for financial datasets, Feature engineering for financial modeling and prediction, Handling missing data, outliers, and data normalization, Time-series data preprocessing and feature extraction.	
Unit III Machine Learning Models in Finance	**[10 Hrs]**
Overview of supervised and unsupervised learning algorithms, Regression models for financial forecasting (e.g., stock price prediction), Classification models for fraud detection and credit risk assessment, Clustering techniques for portfolio optimization and customer segmentation, Predictive modeling for stock price forecasting and risk assessment.	
Unit IV Neural Networks and Deep Learning	**[9Hrs]**
Fundamentals of neural networks and deep learning, Architectures of deep learning models (e.g., feedforward neural networks, convolutional neural networks, recurrent neural networks). Applications of deep learning in finance: text mining, sentiment analysis, and image recognition, Case studies of successful deep learning applications in finance	
Unit V AI Ethics and Regulation in Finance	**[8Hrs]**
Ethical considerations in AI-driven finance, Regulatory challenges and compliance requirements, Fairness, transparency, and accountability in AI algorithms, Societal implications and future directions	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1	Machine Learning for Finance: Principles and Applications in Python	Jannes Klaas	1st	Packt
2	Ethics of Artificial Intelligence and Finance"	Rajiv Sethi	1st	Pale Macmilln
3.	Artificial Intelligence in Finance	Yves Hilpisch	1st	O'Reilly Media,

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Artificial Intelligence and Financial Markets	Lawrence R. Ritter	1st	Springer

SEVEN SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AI761O(i)	OE-III Introduction to Cloud Computing with ML	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended to • Understand the Machine Learning Workflow • Leverage AWS Services for ML • Hands-On Practical Experience • Focus on Model Deployment and Management	**Students will be able to** • Introduction to cloud and machine learning concepts. • Apply machine learning on AWS and data preparation. • Performing exploratory data analysis in AWS. • Apply Model Selection, training, evaluation and hyper parameter tuning in AWS cloud. • Apply Deploying, monitoring and managing ML Models on AWS

Unit I: Introduction to Cloud and machine learning	**[9Hrs]**
Definition and Evolution of Cloud Computing, Cloud Service Models: IaaS, PaaS, SaaS, Cloud Deployment Models: Public, Private, Hybrid, Community, virtualization, virtual machine concept, Overview of Major Cloud Service Providers. Overview of machine learning concepts, definition, types of machine learning, applications. Machine learning algorithms: Supervised algorithms: Regression, classification: KNN, Naïve bayes, decision trees, random forest, SVM. Unsupervised algorithms: k-means, DBSCAN, hierarchical clustering algorithms.	
Unit II: Introduction to Machine Learning with AWS	**[9Hrs]**
AWS Services for Machine Learning, Setting Up Your AWS Environment, Introduction to Amazon SageMaker, **Data Preparation for Machine Learning** Data Collection Strategies, Data Cleaning and Preprocessing, Data Storage on AWS: S3, RDS, DynamoDB, Hands-On: Uploading and Managing Data on AWS.	
Unit III: Exploratory Data Analysis in AWS	**[10Hrs]**
Techniques for EDA, Visualizing Data with AWS Services, Hands-On: EDA using AWS Glue and Amazon QuickSight.	
Unit IV: Model Selection, training, evaluation and hyperparameter tuning	**[9Hrs]**
Choosing the Right Model, Training Machine Learning Models, Distributed Training on AWS, Hands-On: Training a Model with Amazon SageMaker, Evaluating Model Performance, Hyperparameter Tuning Techniques, Using SageMaker for Hyperparameter Optimization, Hands-On: Hyperparameter Tuning on AWS	
Unit V: Deploying, monitoring and managing ML Models on AWS	**[8Hrs]**
Introduction to Model Deployment, Deploying Models with SageMaker Endpoints, Hands-On: Deploying a Model to Production on AWS, Model Monitoring and Logging, Managing Model Versions, Hands-On: Monitoring and Managing Models with SageMaker, Case Study: Healthcare, Finance, and Retail.	

Text Books

Sr. No.	Title	Authors	Edition	Publisher
1.	Cloud Computing: Concepts, Technology & Architecture	Thomas Erl	1st	Prentice Hall
2.	Practical Machine Learning with AWS: Process, Build, and Deploy Intelligent Solutions	Himanshu Singh and Drew Tawse	1st	Packt Publishing
3.	Architecting the Cloud: Design Decisions for Cloud Computing Service Models	Michael J. Kavis	1st	Wiley

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1.	Mastering Cloud Computing: Foundations and Applications Programming	Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi	1st	Morgan Kaufmann
2.	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow	Aurélien Géron	2nd	O'Reilly Media
3.	Online tutorials and documentation from AWS			