LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Data Mining and Online Transaction Processing	MAI-301	3	1	0	80	20	100

Course Objective	To make students learn different data mining techniques and enable them to draw pattern of the data to apply for decision making.

Units	Contents (*Theory*)	Hours /week
I	**Motivation, importance, Data type for Data Mining:** relation Databases, Data Warehouses, Transactional databases, advanced database system and its applications, Data mining Functionalities: Concept/Class description, Association Analysis classification & Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis, Classification of Data Mining Systems, Major Issues in Data Mining.	8
II	**Data Warehouse and OLAP Technology for Data Mining:** Differences between Operational Database Systems and Data Warehouses, a multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology.	8
III	**Data Preprocessing:** Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Languages, and System Architectures, Concept Description: Characterization and Comparison, Analytical Characterization.	8
IV	**Mining Association Rules in Large Databases:** Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single -Dimensional Boolean Association Rules from Transactional Databases: the Apriori algorithm, Generating Association rules from frequent items, improving the efficiency of Apriory, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint -Based Association Mining.	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

V	**Classification & Prediction and Cluster Analysis:** Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, and Applications & Trends in Data Mining: Data Mining Applications, currently available tools.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
J. Han and M. Kamber	Data Mining: Concepts and Techniques		Morgan Kaufmann Publication
Berson	Dataware housing, Data Mining & DLAP		TMH
W.H. Inmon	Building the Dataware house	3 ed	Wiley India
Anahory	Data Warehousing in Real World		Pearson Education
Adriaans	Data Mining		Pearson Education
S.K. Pujari	Data Mining Techniques		University Press, Hyderabad

COURSE OUTCOMES: Students will be able to

CO1	To fully understand standard data mining methods and techniques such as association rules, data clustering and classification.
CO2	Explore Data Warehouse and OLAP and device efficient & Cost Effective Method for maintaining Data Warehouse
CO3	Mining Association Rules in Large Databases, Cluster Analysis

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Neural Network and Deep Learning (Vision and NLP)	**MAI-302**	3	1	0	80	20	100

Course Objective	The objective of this course is to teach students the basic concepts of neural networks, neurons, and deep learning.

Units	Contents (*Theory*)	Hours /week
I	The neural network: The neuron, linear perceptron, feed-forward neural network, limitations of linear neurons, sigmoid, tanh, relu neurons, softmax output layer, information theory, cross entropy, Kullback-Leibler divergence	8
II	Training feed-forward neural network: Gradient Descent, delta rules and learning rates, gradient descent with sigmoidal neurons, the back-propagation algorithms, stochastic and minibatch gradient descent, test sets, validation sets and overfitting, preventing overfitting	8
III	Tensor Flow: Computation graphs, graphs, sessions and fetches, constructing and managing graph, flowing tensors, sessions, data types, tensor arrays and shapes, names, variables, placeholders and simple optimization, linear regression and logistic regression using tensor flow	8
IV	Implement Neural Network: Introduction to Keras, Build neural network using Keras,	8
V	Evaluating models, data preprocessing, feature engineering, feature learning, overfitting, underfitting, weight regularization, dropout, universal workflow of deep learning	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Francois Chollet	Deep Learning with Python	1 edition	Manning Publications
Tensor Flow for Deep Learning Ian Goodfellow, Yoshua Bengio, Aaron Courville	Reza Zadeh, Bharath Ramsundar - Shroff/ Deep Learning	First edition (2018) MIT Press	O'Reilly

COURSE OUTCOMES: Students will be able to	
CO1	Neural Network, Feed Forward and Backpropogation
CO2	Tensorflow and Keras
CO3	RNN, CNN, Autoencoders

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Machine Learning and Pattern Recognition	**MAI-303**	3	1	0	80	20	100

Course Objective	The objective of this course is to provide the students with foundations in the basic concepts of Machine Learning and Pattern Recognition.

Units	Contents (*Theory*)	Hours /week
I	Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.	8
II	Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, back-propagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.	8
III	Convolutional neural network, flattening, sub-sampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.	8
IV	Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL -framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA.	8
V	Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: Image Net Competition.	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Christopher M. Bishop	Pattern Recognition and Machine Learning	2nd Edition, 2011	Springer -Verlag New York Inc.
Tom M. Mitchell	Machine Learning	First edition, 2017	McGraw Hill Education
Ian Goodfellow and Yoshua Bengio and Aaron Courville	Deep Learning		MIT Press, 2016
Aurelien Geon	Hands -On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems	First edition	Shroff/O'Reilly
Francois Chollet	Deep Learning with Python	1 edition	Manning Publications
Andreas Muller	Introduction to Machine Learning with Python: A Guide for Data Scientists	First edition	Shroff/O'Reilly

COURSE OUTCOMES: Students will be able to	
CO1	Explain Machine Learning concepts, classifications of Machine Learning
CO2	Describe Supervised and unsupervised Learning concepts.
CO3	Understand neural network
CO4	Explain application of machine learning in computer vision

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Compiler Design	**MAI-304 (E-I(1))**	3	1	0	80	20	100

Course Objective	The objective this course is compiler course is to understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.

Units	Contents (*Theory*)	Hours /week
I	**Introduction**: Objective, Compiler, Translator, Interpreter definition, Phase of compiler. Bootstrapping, Review of Finite automata lexical analyzer, Input, Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling	8
II	**Review of CFG Ambiguity of grammars:** Introduction to parsing, Top down parsing, LL grammars & passers error handling of LL parser, Recursive descent parsing predictive parsers, Bottom up parsing, Shift reduce parsing, LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Operator precedence parsing, Introduction of automatic parser generator: YACC error handling in LR parsers	8
III	**Syntax directed definitions;** Construction of syntax trees, S Attributed Definition, L-attributed definitions, Top down translation. Intermediate code forms using postfix notation, DAG, Three address code, TAC for various control structures, Representing TAC using triples and quadruples, Boolean expression and control structures	8
IV	**Storage organization;** Storage allocation, Strategies, Activation records, Accessing local and non-local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables	8
V	**Definition of basic block control flow graphs;** DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

	about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.	

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Mishra and Chandrashekaran	Theory of Computer Science – Automata languages and computation	II	PHI
John C Martin	Introduction to Languages and The Theory of Computation		TMH
Tremblay	Theory and Practice of compiler writing		Mc Graw Hill
Holuv	Compiler Design in C		PHI
COURSE OUTCOMES: Students will be able to			
CO1	Use compiler construction tools and describes the Functionality of each stage of compilation process		
CO2	Analyze different representations of intermediate code.		
CO3	Construct new compiler for new languages		
CO4	Design and implement LL and LR parsers		

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Web Technology	MAI-304 (E-I(2))	3	1	0	80	20	100

Course Objective	To provide knowledge of Javascript and HTML to use it web application designing.

Units	Contents (*Theory*)	Hours /week
I	Concept of Internet: Client/Server model, Internet and WWW, IP, URL, ISP, DNS; Web Design : Principals of effective Web Design, Page layout and linking, designing effective navigation for your website, planning and publishing websites, Responsive web design : Responsive vs adaptive web design	8
II	HTML and Style Sheets: Working with HTML - Formatting and Fonts, Basic Tags, Hyperlinks, Tables, Images, Forms, XHTML, Meta tags. Style Sheets (CSS): Introduction, Need, basic syntax and structure, class, id, background Images, Colors and Properties, Manipulating Texts, Margins, Positioning.	8
III	Javascript : Client side scripting with JavaScript, Data Types and Variables, Expressions, Operators and Statements, Objects and Arrays, Functions, loops, Classes, Modules, DOM, Forms and Validations.	8
IV	XML : Introduction, Features, Anatomy, Declaration, Uses, Key Components, DTD and Schema, Markup Elements and Attributes, XML Objects, XML Scripting, Using XML with application, Transforming XML using XSL and XSLT, XPATH - Template Based Transformations.	8
V	Introduction to AJAX : AJAX Components, The XML Http Request Object, Using XSLT with AJAX; Web services : Web Service architecture, introduction to web services, Web Services VS other technologies, Web Services Benefits.	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Jeffrey C. Jackson	Web Technologies --A Computer Science Perspective		Pearson Education, 2006
Developing Web Applications	Ralph Moseley and M. T. Savaliya		Wiley -India
Web Technologies	Black Book		dreamtech Press
Web Design	Joel Sklar		Joel Sklar

COURSE OUTCOMES: Students will be able to	
CO1	Develop a Dynamic webpage by the use of java script and HTML.
CO2	Gain knowledge of client side scripting, validation of forms.
CO3	write a well formed / valid XML document.
CO4	Use AJAX programming and Web Services.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Introduction to Data Science and Big Data	MAI-304 (E-I(3))	3	1	0	80	20	100

Course Objective	To make students learn about big data and their analysis techniques to use in decision making and designing applications.

Units	Contents (*Theory*)	Hours /week
I	INTRODUCTION TO DATA SCIENCE AND BIG DATA Introduction to Data Science – Data Science Process – Exploratory Data analysis – Big data: Definition, Risks of Big Data, Structure of Big Data – Web Data: The Original Big Data – Evolution Of Analytic Scalability – Analytic Processes and Tools – Analysis versus Reporting – Core Analytics versus Advanced Analytics – Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Introduction to Data Visualization.	8
II	DATA ANALYSIS USING R Univariate Analysis: Frequency, Mean, Media n, Mode, Variance, Standard Deviation, Skewness and Kurtosis – Bivariate Analysis: Correlation – Regression Modeling: Linear and Logistic Regression – Multivariate Analysis – Graphical representation of Univariate, Bivariate and Multivariate Analysis in R: Bar Plot, Histogram, Box Plot, Line Plot, Scatter Plot, Lattice Plot, Regression Line, Two-Way cross Tabulation.	8
III	DATA MODELING: Bayesian Modeling – Support Vector and Kernel Methods – Neuro – Fuzzy Modeling – Principal Component Analysis – Introduction to NoSQL: CAP Theorem, Mongo DB: RDBMS Vs MongoDB, Mongo DB Database Model, Data Types and Sharding – Data Modeling in HBase: Defining Schema – CRUD Operations	8
IV	DATA ANALYTICAL FRAMEWORKS : Introduction to Hadoop: Hadoop Overview – RDBMS versus Hadoop – HDFS (Hadoop Distributed File System): Components and Block Replication – Introduction to MapReduce –	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

	Running Algorithms Using Map Reduce – Introduction to HBase: HBase Architecture, HLog and HFile, Data Replication – Introduction to Hive, Spark and Apache Sqoop.	
V	STREAM ANALYTICS :Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Bill Franks	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics		John Wiley & sons
Rachel Schutt, Cathy O'Neil,	Doing Data Science		O'Reilly

COURSE OUTCOMES: Students will be able to

CO1	Understand data science and Modern Data Analytic Tools
CO2	Understand DATA MODELING and DATA ANALYTICAL FRAMEWORKS
CO3	Describe Big Data and its importance with its applications
CO4	Differentiate various big data technologies like Hadoop MapReduce, Pig, Hive, Hbase

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Internet of Things	MAI-304 (E-I(4))	3	1	0	80	20	100

Course Objective	The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied.

Units	Contents (*Theory*)	Hours /week
I	Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.	8
II	Machine-to-machine (M2M), SDN (software defined networking) and NFV (network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.	8
III	Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected device s, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.	8
IV	Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT, Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.	8
V	IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Priva cy and security solutions, Raspberry Pi &arduino devices. IOT Case studies: smart city streetlights control & monitoring.	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Rajkamal	Internet of Things		Tata McGraw Hill
Vijay Madisetti and ArshdeepBahga	Internet of things (A - Hand-on-Approach)	1st Edition	Universal Press
Hakima Chaouchi	The Internet of Things: Connecting Objects		Wiley publication.
Charless Bell	MySQL for the Internet of things		A press publications
Francis dacosta	Rethinking the Internet of things: A scalable Approach to connecting everything	1st edition	Apress publications2013
Donald Norris	The Internet of Things: Do – It - Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black		McGraw Hill publication.

COURSE OUTCOMES: Students will be able to	
CO1	Describe what IoT is and how it works
CO2	Use real IoT protocols for communication
CO3	Evaluate the wireless technologies for IoT.
CO4	Implement basic IoT applications on embedded platform

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Machine Learning	MAI-305 (E-II(1))	3	1	0	80	20	100

Course Objective	The Objective of this course is To understand various key paradigms for machine learning approaches and To familiarize with the mathematical and statistical techniques used in machine learning.

Units	Contents (*Theory*)	Hours /week
I	Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.	8
II	Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, back-propagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.	8
III	Convolution neural network, flattening, sub-sampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.	8
IV	Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL -framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA.	8
V	Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: Image Net Competition.	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Christopher M. Bishop	Pattern Recognition and Machine Learning	2nd Edition, 2011	Springer -Verlag New York Inc.
Tom M. Mitchell	Machine Learning	First edition, 2017	McGraw Hill Education
Ian Goodfellow,Yoshua Bengio, Aaron Courville	Deep Learning		MIT Press, 2016
Aurelien Geon	Hands -On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems	First edition	Shroff/O'Reilly
Francois Chollet	Deep Learning with Python	1 edition	Manning Publications
Andreas Muller	Introduction to Machine Learning with Python: A Guide for Data Scientists	First edition	Shroff/O'Reilly
Russell, S. and Norvig, N	Artificial Intelligence: A Modern Approach		Prentice Hall Series in Artificial Intelligence. 2003

COURSE OUTCOMES: Students will be able to	
CO1	Explain Machine Learning concepts, classifications of Machine Learning
CO2	Describe Supervised and unsupervised Learning concepts.
CO3	Understand neural network
CO4	Explain application of machine learning in computer vision

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
SOFT COMPUTING	MAI-305 (E-II (2))	3	1	0	80	20	100

Course Objective	The objective of the course is to expose the students to soft computing, various types of soft computing techniques, and applications of soft computing.

Units	Contents (*Theory*)	Hours /week
I	Overview of Soft Computing, Difference between Soft and Hard computing, Brief descriptions of different components of soft computing including Artificial intelligence systems Neural networks, fuzzy logic, genetic algorithms. Artificial neural networks Vs Biological neural networks, ANN architecture, Basic building block of an artificial neuron, Activation functions, Introduction to Early ANN architectures (basics only) -McCulloch & Pitts model, Perceptron, ADALINE, MADALINE	8
II	Artificial Neural Networks: Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The perceptron, Back-propagation networks: architecture, multilayer perceptron, back-propagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network.	8
III	Artificial Neural Networks: Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self-Organizing Computational Maps: Kohonen Network.	8
IV	Fuzzy Logic Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller.	8
V	Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections,	8

	Convergence of GA, Applications of GA case studies. Introduction to genetic programming- basic concepts.	

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R. Rajasekaran and G. A and Vijayalakshmi Pa	Neural Networks, Fuzzy Logic, and Genetic Algorithms		Prentice Hall of India
D. E. Goldberg	Genetic Algorithms in Search, Optimization, and Machine Learning ,Addison-Wesley supplementary reading G . L. Fausett, Fundamentals of Neural Networks		Prentice Hall
T. Ross,	Fuzzy Logic with Engineering Applications		Tata McGraw Hill

COURSE OUTCOMES: Students will be able to

CO1	Learn about soft computing techniques and their applications
CO2	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
CO3	Fuzzy logic and its applications.
CO4	Apply genetic algorithms to combinatorial optimization problems

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Computer Graphics	MAI-305 (E-II(3))	3	1	0	80	20	100

Course Objective	The objective of this module is to introduce to the students the concepts of computer graphics. it presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curves and an introduction to 3D transformation.

Units	Contents (*Theory*)	Hours /week
I	Introduction to Computer Graphics and its applications, Components and working of Interactive Graphics; Video Display Devices: Raster scan and Random Scan displays, Display Processors; Resolution, Aspect Ratio, Refresh CRT, interlacing; Color CRT monitors, LookUp tables, Plasma Panel and LCD monitors, Interactive Input and Output Devices: keyboard, mouse, trackball, joystick, light pen, digitizers; image scanners, Touch Panels; Voice systems; printers, plotters; Graphics Software; Coordinate Representations;	8
II	**Drawing Geometry:** Symmetrical and Simple DDA line drawing algorithm, Bresenham's line Algorithm; loading frame buffer; Symmetrical DDA for drawing circle, Polynomial method for circle drawing; circle drawing using polar coordinates, Bresenham's circle drawing; Generation of ellipse; parametric representation of cubic curves, drawing Bezier curves; Filled-Area Primitives: Flood fill algorithm, Boundary fill algorithm, Scan-line polygon fill algorithm	8
III	**2-D Transformations:** translation, rotation, scaling, matrix representations and homogeneous coordinates, composite transformations, general pivot point rotation, general fixed point scaling, Shearing; Reflection ; Reflection about an arbitrary line; 2-D Viewing: window, viewport;	8
IV	2-D viewing transformation, zooming, panning; Clipping operations: point and line clipping, Cohen-Sutherland line clipping, mid-point subdivision line clipping, Liang-Barsky line clipping, Sutherland-Hodgman polygon clipping; Weiler-Atherton polygon Clipping Pointing and positioning techniques; rubber	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

	band technique; dragging;	
V	**3-D Graphics:** 3-D modeling of objects, 3D transformation matrices for translation, scaling and rotation, parallel projection: Orthographic and oblique projection; perspective projection; Hidden surface removal: Zbuffer, depth-sorting, area subdivision, BSP-Tree method; Ray casting; Shading: Modelling light intensities, Gouraud shading, Phong shading; Introduction to Animation, Tweening, Morphing, Fractals;	8

Text Books/ References Book:-

Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
D.P. Mukherjee	Fundamentals of Computer Graphics and Multimedia		PHI
Newmann & Sproull, ,	Principles of Interactive Computer Graphics		McGraw Hill
Apurva A. Desai,	Computer Graphics		PHI
Rogersl	Procedural Elements of Computer Graphics		McGraw Hill

COURSE OUTCOMES: Students will be able to

CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis
CO3	Extract scene with different clipping methods and its transformation to graphics display device
CO4	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Distributed Systems	MAI-305 (E-II(4))	3	1	0	80	20	100

Course Objective	Objective of this Course is To provide hardware and software issues in modern distributed systems. To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.

Units	Contents (*Theory*)	Hours /week
I	Introduction to Distributed Systems: Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications	8
II	Process and synchronization in Distributed Systems: Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.	8
III	Consistency, Replication, fault tolerance and security: Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.	8
IV	Distributed Object Based and File Systems : CORBA, Distributed COM, Goals a nd Design Issues of Distributed file system, types of distributed file system, sun network file system,.	8
V	Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems : the world wide web, distributed co-ordination based systems: JINI Implementation: JAVA RMI, OLE,	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - III wef: July 2021

	ActiveX, Orbix, Visbrokes, Object oriented programming with SOM	

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Andrew S. Tanenbaum, Maarten Van Steen	Distributed Systems Principles and Paradigms		Pearson Education Inc. 2002.
Lui	Distributed Computing Principles and Applications		
Harry Singh	Progressing to Distributed Multiprocessing		Prentice -Hall Inc
B.W. Lampson	Distributed Systems Architecture Design & Implementation		1985 Springer Varlag.
Parker Y. Verjies J. P.	Distributed computing Systems, Synchronization, control & Communications		PHI
Robert J. & Thieranf	Distributed Processing Systems		Prentice Hall
George Coulios	Distribute System: Design and Concepts		Pearson Education

COURSE OUTCOMES: Students will be able to	
CO1	To provide hardware and software issues in modern distributed systems.
CO2	Explain Process and synchronization in Distributed Systems
CO3	To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
CO4	Understand How Distributed Shared Memory is managed.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) **Semester - III** **wef: July 2021**

Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Minor Project	**MAI-306**	**P**	**J**	**ESP**	**CAP**	**Total**
		4	4	120	80	200

A complete application is to be designed using front end and back end.

Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Elective -I Lab	**MAI-307**	**P**	**J**	**ESP**	**CAP**	**Total**
		2	0	30	20	50

Programs are to be implemented based on the elective subject chosen.