LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

<table>
<tr><th rowspan="2">Name of Paper</th><th rowspan="2">Paper Code</th><th colspan="6">Theory</th></tr>
<tr><th colspan="3">Credit</th><th colspan="3">Marks</th></tr>
<tr><td rowspan="2">Data Mining and Online Transaction Processing</td><td rowspan="2">MAI-301</td><td>L</td><td>T</td><td>J</td><td>EST</td><td>CAT</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>80</td><td>20</td><td>100</td></tr>
</table>

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
V	**Classification & Prediction and Cluster Analysis:** Issues regarding classification & prediction, Different Classification Methods, Prediction, Cluster Analysis, Major Clustering Methods, and Applications & Trends in	8

	Data Mining: Data Mining Applications, currently available tools.	

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	Learn data mining functionalities and cluster analysis.
CO2	Learn data warehouse architecture.
CO3	Characterize various steps of data mining process.
CO4	Learn multilevel and multidimensional association rules.
CO5	Learn major clustering methods and their analysis.

LNCT UNIVERSITY, BHOPAL

Programmme:- MCA(AI/ML)   Semester - III   wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Neural Network and Deep Learning (Vision and NLP)	MAI-302	L	T	J	EST	CAT	Total
		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 mini batch 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, under-fitting, weight regularization, dropout, universal workflow of deep learning.	8

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	Define neuron and feed forward network.
CO2	Learn back propagation algorithms.
CO3	Construct and manage graphs and tensor arrays.
CO4	Learn keras and build network using keras.
CO5	Evaluate various models.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Machine Learning and Pattern Recognition	**MAI-303**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		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 2022

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

COURSE OUTCOMES: Students will be able to	
CO1	Explain Machine Learning concepts, classifications of Machine Learning
CO2	Learn normalization and L1, L2 regularization.
CO3	Learn convolutional neural network.
CO4	Learn RL framework and Bellman equations
CO5	Understand the concepts of natural language processing.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

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

Course Objective	The objectives of this course is to enable students to understand, explore, and acquire a critical understanding cyber law. Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes that are taking place via the internet.

Units	Contents (*Theory*)	Hours /week
I	**Introduction**: Cyber Security – Cyber Security policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration - Strategy Versus Policy – Cyber Security Evolution – Productivity – Internet – E-commerce – Counter Measures - Challenges.	8
II	**Application Security:** Data Security Considerations, Backups, Archival Storage and Disposal of Data. Security Threats: Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce, Electronic Payment System, E-Cash, Credit/Debit Cards, Digital Signature.	8
III	**Internet Security:** Security Issues on Web, Importance of Firewall, Components of Firewall, Transaction Security, Emerging Client Server, Security Threats, Network Security, Factors to Consider in Firewall Design, Limitation of Firewalls, Introduction to Biometric Security and its Challenges, Finger Prints.	8
IV	**Fundamentals of Cyber Laws:** Security Policies, WWW Policies, E-mail Security Policies, Corporate Policies, Publishing and Notification Requirement of the Policies. Intellectual Property Law: Copyright Act, Patent Law, Software Piracy and Software License, Semiconductor Law and Patent Law, Cyber Laws in India: IT Act 2000 Provisions.	8

V	**Investigation and Ethics:** Cyber Crime, Cyber Jurisdiction, Cyber Crime and Evidence Act, Treatment of Different Countries of Cyber Crime, Ethical Issues in Data and Software Privacy, Plagiarism, Pornography, Tampering Computer Documents, Data Privacy and Protection, Domain Name System, Software Piracy, Issues in Ethical Hacking.	8

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Rick Howard	Cyber Security Essentials		Auerbach Publications
MayankBhushan	Fundamentals of Cyber Security		BPB Publications
Gupta & Gupta	Information Security & Cyber Laws		Khanna Publishing House
Farooq Ahmad	Cyber Law in India		Pioneer Books.
Harish Chander	Cyber Law and IT Protection		PHI Publication.

COURSE OUTCOMES: Students will be able to	
CO1	Understand the concept of cybercrime and its effect on outside world
CO2	Learn various threats to data.
CO3	Interpret and apply IT law in various legal issues
CO4	Distinguish different aspects of cyber law
CO5	Apply Information Security Standards compliance during software design and development

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) Semester - III wef: July 2022

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

Course Objective	The objective this 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 about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code	8

	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
CO5	Understand control flow graph with examples

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Introduction to Data Science and Big Data	MAI-304 (E-I(3))	L	T	J	EST	CAT	Total
		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 – Running Algorithms Using Map Reduce – Introduction to HBase: HBase Architecture, HLog and HFile, Data Replication – Introduction to Hive, Spark	8

	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	Learn various data analysis tools.
CO3	Learn and understand data modelling tools.
CO4	Differentiate various big data technologies like Hadoop MapReduce, Pig, Hive, Hbase.
CO5	Understand stream computing and filtering streams.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

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

Course Objective	This 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 network ing) 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 Privacy 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 2022**

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 IoT architecture and its physical/logical design.
CO2	Understand M2M and SDN networking.
CO3	Learn design principles for web connectivity.
CO4	Evaluate the wireless technologies for IoT.
CO5	Implement basic IoT applications on embedded platform

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) Semester - III wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Design and Analysis of Algorithms	**MAI-305 (E-II(1))**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		3	1	0	80	20	100

Course Objective	The objectives of this course is to apply important algorithmic design paradigms and methods of analysis.

Units	Contents (*Theory*)	Hours /week
I	**Pre-requisites:** Data structure & Discrete structures, models of computation, algorithm analysis, order architecture, time space complexities average and worst case analysis.	8
II	**Divide and conquer:** Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations. Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search)	8
III	**Greedy Method:** Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths. Branch and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem, searching & sorting algorithms.	8
IV	**Dynamic programming:** Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence. Back tracking: Overview, 8-queen problem, and Knapsack problem	8
V	**Computational Complexity:** Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples. Combinational algorithms, string processing algorithm, Algebric algorithms , set algorithms	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) Semester - III wef: July 2022

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Ullman	"Analysis and Design of Algorithm"		TMH
Goodman	"Introduction to the Design & Analysis of Algorithms		TMH-2002
Sara Basse, A. V. Gelder	Computer Algorithms		Addison Wesley
T. H. Cormen, Leiserson , Rivest and Stein	Introduction of Computer algorithm		PHI
E. Horowitz, S. Sahni, and S. Rajsekaran	Fundamentals of Computer Algorithms		Galgotia Publication

COURSE OUTCOMES: Students will be able to	
CO1	Describe time and space complexities.
CO2	Design algorithms using divide and conquer, greedy and dynamic programming.
CO3	Solve knapsack problem and apply branch and bound techniques.
CO4	Apply the dynamic programming technique to solve real world problems such as knapsack and TSP, 8 Queens problem etc.
CO5	Understand NP hard problems.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
SOFT COMPUTING	MAI-305 (E-II (2))	L	T	J	EST	CAT	Total
		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, Convergence of GA, Applications of GA case studies. Introduction to genetic programming- basic concepts.	8

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	Learn supervised learning concepts and back propagation networks.
CO3	Learn unsupervised learning and kohonen network
CO4	Understand fuzzy sets and fuzzy relations.
CO5	Apply genetic algorithms to combinatorial optimization problems.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

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

Course Objective	The objective of this subject is to introduce 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 band technique; dragging;	8
V	**3-D Graphics:** 3-D modeling of objects, 3D transformation matrices for translation, scaling and rotation, parallel projection: Orthographic and oblique	8

	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;	

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	Describe various I/O devices.
CO2	Use various graphical design algorithms.
CO3	Use 2-D transformation methods.
CO4	Use various clipping methods.
CO5	Use 3-D transformation methods and projection methods.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

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 tolerence, 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, ActiveX, Orbix, Visbrokes, Object oriented programming with SOM	8

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

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	Describe hardware and software issues in modern distributed systems.
CO2	Explain clock synchronization and mutual exclusion.
CO3	Describe synchronization, consistency and replication, fault tolerance, security.
CO4	Explain goal and design issues in distributed systems.
CO5	Understand distributed shared memory management.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) **Semester - III** **wef: July 2022**

Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Minor Project on NLP	**MAI-306**	**P**	**J**	**ESP**	**CAP**	**Total**
		0	8	120	80	200

A complete application is to be designed using front end and back end tools to fulfill the requirements of any company/firm/office with report generation modules.

LNCT UNIVERSITY, BHOPAL

Programme:- MCA(AI/ML) Semester - III wef: July 2022

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

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