

**Integral University, Lucknow**  
**Department of Computer Application**  
**STUDY & EVALUATION SCHEME**  
**Choice Based Credit System**  
**Master of Computer Application (MCA)**  
**w.e.f. Session 2021-22**

**Year II<sup>nd</sup>, Semester III<sup>rd</sup>**

S. No.	Course Category	Subject Code	Name of the Subject	Periods				Evaluation Scheme				Subject Total
								Sessional (CA)			End Sem. Exam	
				L	T	P	C	UE	TA	Total	ESE	
1.	Core	CA551	Artificial Intelligence	3	1	0	4	40	20	60	40	100
2.	Core	CA552	Machine Learning with Python Programming	3	1	0	4	40	20	60	40	100
3.	Core	CA553	Web Technology	3	1	0	4	40	20	60	40	100
4.	Core	CA554	Computer Graphics and Animation	3	1	0	4	40	20	60	40	100
5.	Elective – II			3	1	0	4	40	20	60	40	100
6.	Elective –III			3	1	0	4	40	20	60	40	100
7.	Core	CAN01	Cyber Security*	3	0	0	0	40	20	60	40	100
8.	Core	CA567	Machine Learning with Python Programming Lab	0	0	3	1	40	20	60	40	100
9.	Core	CA568	Web Technology Lab	0	0	3	1	40	20	60	40	100
10.	Core	CA569	Computer Graphics Lab	0	0	2	1	40	20	60	40	100
<b>Total</b>				<b>21</b>	<b>6</b>	<b>8</b>	<b>27</b>					<b>1000</b>

**L** - Lecture      **T** – Tutorial      **P** – Practical      **C** – Credit      **CT** – Class Test    **TA** – Teacher Assessment

**Sessional Total (CA)** = Class Test + Teacher Assessment

**Subject Total** = Sessional Total (CA) + End Semester Examination (ESE)

**Elective – II**

CA555 Cloud Computing  
 CA556 Advanced Concepts in Database System  
 CA557 E-Commerce  
 CA558 Real Time Systems  
 CA559 Social Network Analysis and Evolutionary Computing  
 CA560 Embedded System

**Elective – III**

CA561 Internet of Things  
 CA562 Natural Language Processing  
 CA563 Neural Network  
 CA564 Soft Computing  
 CA565 Virtual reality  
 CA566 Mobile Computing

**\*Cyber Security: Non-Credit Course, Compulsory**

# CA551 ARTIFICIAL INTELLIGENCE

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT -I

**Introduction to AI:** Application of AI, Problem, Problem Space and Searches: Problem Characteristics, Simple Problem Solving, Examples, Searching for Solution.

**Uninformed Search Strategies:** Breadth- First Search, Depth-First Search, Depth Limited Search and Iterative Deepening Search.

**Informed Search Strategies:** BFS, A\* Algorithms, RBFS, Hill-Climbing, Constraint Satisfaction Problem(CSP), Mean-End-Analysis, Optimal Decision in Games. [8]

## UNIT-II

**Knowledge Representation Concept:** Representation and Mapping, Approaches to Knowledge Representation.

**First Order Predicate Logic:** Representing Simple Facts in Logic, Computable Functions and Predicates, Rules of Interface, Resolution, Unification and Lifting, Forward and Backward Chaining.

**Weak Slot-and-Filler Structure:** Semantic Nets Partitioned Nets, MinskyFrames. [8]

## UNIT -III

**Natural Language Processing:** Introduction, Overview of Linguistics, Grammar and Languages, Parsing Techniques, Semantic Analysis and Representation Structure, Natural Language Generation, Natural Language Systems, Introduction to Learning and Expert System. [8]

## UNIT -IV

**Machine Learning:** Supervised and Unsupervised Learning, Decision Trees, Statistical Learning models, Learning with Complete Data: Naive Bayes Models, Learning with Hidden Data: EM algorithm, Reinforcement Learning.

**Game Playing:** Overview, MiniMax, Alpha-Beta Cut-off, Refinements, Iterative deepening. [8]

## UNIT-V

**Pattern Recognition:** Introduction, Design Principles of Pattern Recognition System, Statistical Pattern Recognition, Parameter Estimation Methods: Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

**Introduction to Prolog:** Syntax and Numeric Function, Basic List Manipulation Functions in Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Array. [8]

## REFERENCES:

1. Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-hill Education Pvt. Ltd.
3. E.Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education.
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

# CA552 MACHINE LEARNING WITH PYTHON PROGRAMMING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: CA567**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction to Machine Learning:**Traditional Programming vs Machine Learning, Machine Learning Model, Applications of Machine Learning, Overview of Supervised and Unsupervised Machine Learning, Machine Learning vs Statistical Modeling, Supervised vs Unsupervised Learning, Advantage of using Python libraries for implementing Machine Learning models. Regression: Linear, Non-linear, Simple, Multiple regression and their applications. Evaluate regression model and calculate its accuracy. Classification: Overview of classification techniques, Different classification algorithms; KNN, Decision Trees, Logistic Regression and SVM. Clustering: Clustering approaches. Types of clustering: Partitioned-based Clustering, Hierarchical Clustering and Density-based Clustering. [8]

## UNIT-II

**Machine Learning Algorithms:**Data Processing for Machine Learning: Advanced Data Mugging, Outlier Analysis, Treating for missing values, Normalization vs Standardization of data, Loading datasets, Feature extraction from data sets,Supervised Machine Learning algorithms, K-Nearest Neighbors (KNN) concept and application, Naive Bayes concept and application, Logistic Regression concept and application, Classification Trees concept and application, Unsupervised Machine Learning algorithms, K-means clustering application, Hierarchical Clustering and application. [8]

## UNIT-III

**Basics of Python Programming:**Overview of Python, Using IDLE on Windows, Working at the command line or IDE, Basics of Python Programming using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

**Types, Operators and Expressions:**Types :Integers, Strings, Booleans Operators: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass. [8]

## UNIT-IV

**Data Structures:**Lists: Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions.

**Functions:** Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Lamda function, Scope of the Variables in a Function - Global and Local Variables.

**Modules:** Creating modules, import statement, from Import statement, name spacing. [8]

## UNIT-V

**Packages:** Introduction to PIP, Installing Packages via PIP, Python core packages, Using Python Packages.

**Standard Library:** Numpy, Pandas, Analysis of Datasets using Pandas and Matplotlib library.

**Object Oriented Programming:** Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

**Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User defined Exceptions. [8]

**REFERENCES:**

1. Andreas C. Müller, Sarah Guido, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, O'Reilly Media, 1st edition, 2016.
2. M. Gopal, “Applied Machine Learning”, McGraw Hill Education, 2019.
3. Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
4. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
5. Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson, 2018.
6. Allen Downey, “Think Python”, Green Tea Press, 2015.
7. W.Chun, “Core Python Programming”, Pearson, 2006.

# CA553 WEB TECHNOLOGY

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: CA568**

**L T P**  
**3 1 0**

## UNIT-I

History and Growth of Web, Concept of WWW, Protocols Governing the Web, Introduction to Cyber Laws, Concept of Effective Web Design.

Web Project, Web Team, Team dynamics, Multi-departmental and LargeScale Website, Technological Advances and Impact on Web Team. [6]

## UNIT-II

**HTML:** Basics of HTML, Structure of HTML, Formatting tags, Links, List, Tables, Frames, Images, HTML forms, Overview and Features of HTML5

**DHTML and CSS:** Introduction to CSS, Structure and Syntax of CSS, Internal CSS, External CSS, Inline CSS, Using CSS, Background Images, Colors and Properties, Manipulating Texts, using Fonts, Borders, Padding lists. [9]

## UNIT-III

**JavaScript:** Introductions to JavaScript, Features, Variables, Documents, Forms, Statements, Functions, Object in JavaScript, Event and Event Handling, DOM, Manipulations using DOM, Form Validation using JavaScript, Combining HTML, CSS and JavaScript. [9]

## UNIT-IV

**XML:** Introduction, Displaying an XML document, Data Interface with an XML document, Document Type Definitions, Internal and External DTD, Parsers using XML, Client side usage, Server side usage. [8]

## UNIT-V

**PHP:** Introduction and basic Syntax of PHP, Operator, Variable, String, Decision Making and Looping with examples, PHP and HTML, Basic example of PHP.

**AJAX:** Introduction to AJAX, AJAX Internals, AJAX Framework.

Introduction to COM /DCOM, ASP. [8]

## REFERENCES:

1. Burdman, "Collaborative Web Development", Addison Wesley.
2. Sharma & Sharma, "Development of E-Commerce Sites," Addison Wesley.
3. Ivan Bayross, "Web Technologies Part II", BPB Publications.
4. Steven Holzer, "HTML Black Book", Dreamtech Press.
5. Kogent Learning Solutions Inc., "Web Technologies Black Book", Dreamtech Press.

# CA554 COMPUTER GRAPHICS AND ANIMATION

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: CA569**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction to Computer Graphics:** Definition, Application, Pixel and Frame Buffer, Raster and Random Scan Display, Display Devices: CRT, Color CRT Monitors, Scan Conversion of Line, DDA Algorithm of Line Drawing, Bresenham's Line Algorithm, Midpoint Circle Algorithm, Polygon Filling, Scan Line Polygon Filling Algorithm, Flood Fill Algorithm and Boundary Fill Algorithm. [8]

## UNIT-II

**Mathematics for Computer Graphics:** Point Representation, Vector Representation, Matrices and Operations Related to Matrices, Vector Addition and Vector Multiplication, Scalar Product of two Vectors, Vector Product of two Vectors.

**Segments and Display Files:** Segment Table, Creating, Deleting, and Renaming Segments.

**Windowing and Clipping:** Window to View Port Transformation, Point Clipping, Line Clipping (Cohen Sutherland Line Clipping, Liang Barsky Line Clipping Algorithm), Polygon Clipping, Sutherland and Gary Hodgman Polygon Clipping Algorithm. [8]

## UNIT-III

**Computer Graphics Algorithm:** Hidden Surface Removal, Depth Comparison, Z-Buffer Algorithm, Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm, Light and Color, Different Color Models: RGB, CMY, YIQ, Spline and Bezier Representation, Interpolation and Approximation Splines, Hermite Interpolation. [8]

## UNIT-IV

**Transformation (2D and 3D):** 2-Dimensional Transformation: Translation, Rotation, Scaling, Matrix Representation and Homogeneous Coordinate, Composite Transformation including General Pivot Point Rotation, General Fixed Point Scaling, Reflection, Shearing. 3-Dimensional Transformation: Translation, Rotation, Scaling, Reflection, Shear. [8]

## UNIT-V

**3D Animation:** Introduction to 3D Studio Max, Exploring the Max Interface, Controlling and Configuring the View Ports, Working with Files, Importing and Exporting, Creating and Editing Primitive Objects, Selecting and Setting Object Properties, Transforming Objects, Pivoting, Aligning, Snapping and Cloning Objects, Grouping and Linking Objects. [8]

## REFERENCES:

1. Donald Hearn and M Pauline Baker, "Computer Graphics", PHI.
2. Kelly L. Murdock, "3ds Max-Bible 2011", Wiley Publications.
3. Steven Harrington, "Computer Graphics: A Programming Approach", TMH.
4. Prajapati A.K., "Computer Graphics", Pragati Prakashan Ed2.
5. Foley James D, "Computer Graphics", Addison Wesley Ed2.
6. Newman and Sprould, "Principle of Interactive Computer Graphics", McGraw Hill.
7. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill.

# CA555 CLOUD COMPUTING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Overview of Computing Paradigm:** Grid Computing, Cluster Computing, Distributed Computing, Utility Computing and Cloud Computing, Evaluation to Cloud Computing.

**Introduction to Cloud Computing:** Defining Cloud Computing.

**Cloud Types:** The NIST Model, Cloud Cube Model, Deployment Models and Service Models.

**Characteristics of Cloud Computing:** Paradigm Shift, Benefits of Cloud Computing, Disadvantages of Cloud Computing, Assessing the Role of Open Standards. [8]

## UNIT-II

**Cloud Computing Architecture:** Comparison with Traditional Computing Architecture (Client/Server), Cloud Computing Stack, Connecting to the Cloud.

**Introduction to Service Models:** Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Defining Identity as a Service (IDaaS) and Defining Compliance as a Service (CaaS). [9]

## UNIT-III

**Abstraction and Virtualization:** Virtualization and Cloud Computing, Types of Hardware Virtualization: Full, Partial and Para.

**Virtualization:** Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization and Network Virtualization, Load Balancing, Abstraction Technique using Hypervisors, Machine Imaging.

**Capacity Planning:** Defining Baseline and Metrics, Network Capacity, Scaling. [9]

## UNIT-IV

**Cloud Security:** Cloud Security Fundamentals, Security Boundary, Security Service Boundary and Security Mapping.

**Securing Data:** Brokered Cloud Storage Access, Storage Location and Tenancy, Encryption, Auditing and Compliance.

**Cloud Computing Security Architecture:** Architectural Consideration, General Issues, Trusted Cloud Computing.

**Establishing Identity and Presence:** Identity Protocol Standards, Windows Azure Identity Standards and Presence. [8]

## UNIT-V

**Service Oriented Architecture (SOA):** Introduction to SOA, Defining SOA Communications, Managing and Monitoring SOA, Relating SOA and Cloud Computing.

**Cloud Based Storage:** Measuring the Digital Universe, Provisioning Cloud Storage, Exploring Cloud Backup Solutions and Cloud Storage Interoperability. [8]

## REFERENCES:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley India, 2010.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley, 2011.

3. Nikos Antonopoulos, Lee Gillam, "Cloud Computing: Principles, Systems and Applications", Springer, 2012.
4. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010.



# CA556 ADVANCED CONCEPTS IN DATABASE SYSTEM

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

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## UNIT-I

**Query Processing, Optimization and Database Tuning:** Algorithms for Executing Query Operations, Heuristics for Query Optimizations, Estimations of Query Processing Cost, Join Strategies for Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering and Indexing, Multiple Attribute Search Keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue in RDBMS. [9]

## UNIT-II

**Extended Relational Model and Object Oriented Database System:** New Data Types, User Defined Abstract Data Types, Structured Types, Object Identity, Containment, Class Hierarchy, Logic Based Data Model, Data Log, Nested Relational Model and Expert Database System. [8]

## UNIT-III

**Distributed Database System:** Structure of Distributed Database, Data Fragmentation, Data Model, Query Processing, Semi Join, Parallel and Pipeline Join, Distributed Query Processing in R \* System, Concurrency Control in Distributed Database System, Recovery in Distributed Database System, Distributed Deadlock Detection and Resolution, Commit Protocols. [9]

## UNIT-IV

**Enhanced Data Model for Advanced Applications:** Database Operating System, Introduction to Temporal Database Concepts, Spatial and Multimedia Databases, Data Mining, Active Database System, Deductive Databases, Database Machines, Web Databases, Advanced Transaction Models, Issues in Real Time Database Design. [8]

## UNIT-V

**Introduction to Expert Database and Fuzzy Database System:** Expert Databases, Using the Rules of Deduction in Databases, Recursive Rules.

**Fuzzy Databases:** Fuzzy Set and Fuzzy Logic, Use of Fuzzy Techniques to Define Inexact and Incomplete Databases. [9]

## REFERENCES:

1. Majumdar and Bhattacharya, "Database Management System", TMH.
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill.
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.
4. Data C J, "An Introduction to Database System", Addison Wesley.
5. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill.
6. Bernstein, Hadzilacous, Goodman, "Concurrency Control and Recovery", Addison Wesley.
7. Ceri and Palgatti, "Distributed Databases", McGraw Hill.

## CA557 E-COMMERCE

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

### UNIT-I

**Introduction:** Definition of Electronic Commerce, E-Commerce: Technology and Prospects, Incentives for Engaging in Electronic Commerce, Needs of E-Commerce, Advantages and Disadvantages, Framework, Impact of E-commerce on Business, E-Commerce Models, E-Commerce Process Models: Introduction, Business Models, E-business Models based on the Relationship of Transaction Parties, E-Commerce Sales Life Cycle (ESLC) Model, Roadmap of E-Commerce in India. [8]

### UNIT-II

**Network Infrastructure for E-Commerce:** Internet and Intranet based E-commerce- Issues, Problems and Prospects, Network Infrastructure, Network Access Equipments, Broadband Telecommunication (ATM, ISDN, and FRAME RELAY).

**Mobile Commerce:** Introduction, Wireless Application Protocol, WAP Technology, Mobile Information Device. [8]

### UNIT-III

**Web 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. [8]

### UNIT-IV

**Encryption:** Encryption Techniques, Symmetric Encryption: Keys and Data Encryption Standard, Triple Encryption, Secret Key Encryption, Asymmetric Encryption: Public and Private Pair Key Encryption, Digital Signatures, Virtual Private Network. [8]

### UNIT-V

**Electronic Payments:** Overview, The SET Protocol, Payment Gateway, Certificate, Digital Tokens, Smart Card, Credit Card, Magnetic Strip Card, E-Checks, Credit/Debit Card based EPS, Online Banking, EDI Application in Business, E- Commerce Law, Forms of Agreement, Govt. Policies and Agenda. [8]

### REFERENCES:

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison- Wesley.
2. Pete Lohsin , John Vacca "Electronic Commerce", New Age International.
3. Goel, Ritendra "E-commerce", New Age International.
4. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education.
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH.
6. Turban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education.

# CA558 REAL TIME SYSTEMS

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**

**3 1 0**

## UNIT-I

**Introduction:** Introduction to Real Time Systems, Structure of Real Time System, Various Classification of Real Time Systems, Embedded System, Characterizing Real Time System and Task, Various Issues in Real Time Systems, Real Time OS: Threads and Tasks, Kernel, Case Study of Maruti II, HART OS, VRTX. [8]

## UNIT-II

**Task Scheduling:** Classical Uniprocessor Scheduling Algorithm, Rate Monotonic, EDF, Uniprocessor Scheduling of IRIS Tasks: Identical and Non Identical Linear and Concave Reward Function, 0/1 Reward Function. [8]

## UNIT-III

**Task Assignment and Scheduling:** Task Assignment Algorithms, Utilization Balancing, A Next Fit Algorithm for RM Scheduling, A Myopic Offline Scheduling, FAB Algorithm and Buddy Strategy.

**Real Time Database:** Real Time Vs General Purpose Database, Main Memory Database, Concurrency Control Issues. [8]

## UNIT-IV

**Fault Tolerance Techniques:** Introduction, Fault, Fault Detection and Error Containment, Redundancy Data Diversity, Reversal Checks, Malicious and Integrated Failure Handling, Clock Synchronization: Introduction, Clocks, A Non-Fault Tolerant Synchronization Algorithms, Impact of Fault, Fault Tolerant Synchronization in H/W and S/W. [8]

## UNIT-V

**Real Time Communication:** Introduction, N/W Topologies, Protocols: Internet and Resource Reservation Protocols, Real Time Protocol, Contention Based Protocol. [8]

## REFERENCES:

1. C.M. Krishna and Shin, "Real Time Systems", McGraw Hill 1985.
2. Jane W.S. LIU, "Real Time Systems", Pearson Education.
3. Levi and Agarwal, "Real Time System", McGraw Hill.
4. Mathi and Joseph, "Real Time System: Specification, Validation and Analysis", PHI.

# CA559 SOCIAL NETWORK ANALYSIS AND EVOLUTIONARY COMPUTING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction:** Introduction to Web, Limitations of Current Web, Development of Semantic Web, Emergence of the Social Web, Statistical Properties of Social Networks, Network Analysis, Development of Social Network Analysis, Key Concepts and Measures in Network Analysis, Discussion Networks, Blogs and Online Communities, Web Based Networks. [8]

## UNIT-II

**Modeling and Visualization:** Visualizing Online Social Networks, A Taxonomy of Visualizations, Graph Representation, Centrality, Clustering, Node Edge Diagrams, Visualizing Social Networks with Matrix Based Representations, Node Link Diagrams, Hybrid Representations, Modeling and Aggregating Social Network Data, Random Walks and their Applications. [8]

## UNIT-III

**Mining Communities:** Aggregating and Reasoning with Social Network Data, Advanced Representations, Extracting Evolution of Web Community, Detecting Communities in Social Networks, Core Methods for Community Detection and Mining.

**Evolution:** Evolution in Social Networks, Framework, Models and Algorithms for Social Influence Analysis, Algorithms and Systems for Expert Location in Social Networks.

**Text and Opinion Mining:** Introduction to Text Mining in Social Network. [8]

## UNIT-IV

**Introduction to Evolutionary Computing:** Introduction to Evolutionary Algorithm, Evolutionary Programming, Parameter Control in Evolutionary Algorithms, Special Forms of Evolution, Working with Evolutionary Algorithms.

**Evolutionary Algorithms:** Components of Evolutionary Algorithms, Representation (Definition of Individuals), Evaluation Function (Fitness Function), Population, Parent Selection Mechanism, Variation Working of an Evolutionary Algorithm, Evolutionary Computing and Global Optimization.

**Evolutionary Programming:** Recombination, Parent Selection, Survivor Selection. [8]

## UNIT-V

**Working with Evolutionary Algorithms:** Performance Measures, Test Problems for Experimental Comparisons, Example Applications.

**Introduction to Genetic Algorithm:** Mutation, Recombination, Population Models, Parent Selection, Survivor Selection.

**Introduction to Genetic Programming:** Basic Concepts, Bloat in Genetic Programming Problems Involving “Physical” Environments, Example Application: Symbolic Regression. [8]

## REFERENCES:

1. Charu C. Aggarwal, “Social Network Data Analytics”, Springer 2011.
2. Peter Mika, “Social Networks and the Semantic Web”, Springer, 1<sup>st</sup> Edition, 2007.

3. A.E.Eiben, J.E Smith, "Introduction to Evolutionary Computing", Springer.
4. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1<sup>st</sup> Edition, 2010.
5. Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking Techniques and Applications", Springer, 1<sup>st</sup> Edition, 2011.
6. Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.
7. Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, "Computational Social Network Analysis: Trends, Tools and Research Advances", Springer, 2009.
8. Toby Segaran, "Programming Collective Intelligence", O'Reilly, 2012.

# CA560 EMBEDDED SYSTEM

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Basic Terms in Embedded System:** Introduction to Microcontrollers and Microprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architecture, 8051 Microcontrollers-Assembly Language, Architecture of 8051, Registers, Addressing Modes, Instruction Set. [8]

## UNIT-II

**8051 Internal Architecture and Programming:** I/O ports, Memory Organization, Programs showing use of I/O Pins, Interrupts, Interrupt Programming, Timer and Counters, Serial Communication, Programming of Serial Communication. [7]

## UNIT-III

**Introduction of Embedded System:** Application of Embedded System, Embedded Operating System, Design Parameters of Embedded and its Significance, Design Life Cycle, Hardware fundamentals, Digital circuit parameter, O.C and Tristate outputs, I/O sink and Source, Custom single purpose processor optimization, FSMD, Data path and FSM, General purpose Processor and ASIP'S. [9]

## UNIT-IV

**Introduction to RTOS:** Tasks, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes, Advanced processor (Only Architecture), 80386, 80486, ARM (References). [8]

## UNIT-V

Microprocessor Interfacing, I/O addressing, Direct memory access (DMA), Arbitration, Multilevel bus Architecture, Serial Protocol, Parallel Protocols and Wireless Protocol, Real world interfacing: LCD, Stepping motor, ADC, DAC, LED, Pushbuttons, Keyboard, Latch connection, PPI. [8]

## REFERENCES:

1. Frank Vahid, Tony Givargis," Embedded System Design: A Unified Hardware/Software Introduction", John Wiley & Sons, USA, 2011.
2. Ajay V Deshmukh," Microcontrollers: Theory and Applications", Tata McGrawHill Education, India, New Delhi, 2005.
3. David E.Simon, "An Embedded Software Primer", Pearson Education.
4. Muhammad Ali Mazidi and Janice Gillispie, "The 8051 Microcontroller and embedded systems", Pearson Prentice Hall; 2nd edition (26 September 2005).
5. Kenneth Hinz, Daniel Tabak, "Microcontrollers: -Architecture, Implementation and Programming", Tata McGraw-Hill, 2005.
6. Sampath K. Venkatesh,"8051 Microcontroller & Embedded System", S.K. Kataria& Sons, India, New Delhi 2020.

# CA561 INTERNET OF THINGS

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction:** Basics of IoT, History of IoT, Overview and Motivations, Characteristics of IoT, Physical and Logical Design of IoT.

**Definitions and Frameworks:** IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities. [8]

## UNIT-II

**Fundamental IoT Mechanisms and Key Technologies:** Identification of IoT Objects and Services, Structural Aspects of IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, Satellite Technology.

**RFID:** Introduction, Principle of RFID, Components of an RFID system, Issues. [8]

## UNIT-III

**EPC Global Architecture Framework:** EPCIS and ONS, Design Issues, Technological Challenges, Security Challenges, IP for IoT, Web of Things.

**Wireless Sensor Networks:** History and Context, WSN Architecture, Connecting Nodes, Networking Nodes, Securing Communication.

**WSN Specific IoT Applications and Challenges:** Security, QoS, Configuration, Various Integration Approaches, Data Link Layer Protocols, Routing Protocols and Infrastructure Establishment. [8]

## UNIT-IV

**Resource Management in IoT:** Clustering, Software Agents, Clustering Principles in IoT Architecture, Design Guidelines and Software Agents for Object Representation, Data Synchronization, Identity Portrayal.

**Identity Management Models:** Identity Management, Local, Network, Federated and Global Web Identity, User-Centric Identity Management, Device-Centric Identity Management and Hybrid-Identity Management, Identity and Trust. [8]

## UNIT-V

**IoT Privacy, Security and Governance:** Vulnerabilities of IoT, Security Requirements, Threat Analysis, Use Cases and Misuse Cases, IoT Security Tomography and Layered Attacker Model, Identity Establishment, Access Control, Message Integrity, Non-Repudiation and Availability, Security Model for IoT.

**IoT Application:** Smart Metering, Advanced Metering Infrastructure, E-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards. [8]

## REFERENCES:

1. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications.

2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. Parikshit N. MahalleandPoonam N. Railkar, “Identity Management for Internet of Things”, River Publishers, ISBN: 978-87-93102-90-3 (Hard Copy), 978-87-93102-91-0 (ebook).
4. HakimaChaouchi, “The Internet of Things Connecting Objects to the Web”,ISBN : 978-184821-140-7, Willy Publications.
5. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key Applications and Protocols”, ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications.
6. Daniel Kellmerit, Daniel Obodovski, “The Silent Intelligence: The Internet of Things”, Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 9780989973700.
7. Fang Zhaho, Leonidas Guibas, “Wireless Sensor Network: An Information Processing Approach”, Elsevier, ISBN: 978-81-8147-642-5.



# CA562 NATURAL LANGUAGE PROCESSING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Natural Language Processing:** Introduction, Text, Textual Sources and Formats.

**Finding Structure of Words:** Words and their Components, Tokenization, N-grams and Scriptio continua, Stemming and Lemmatization, Synsets and Hypernyms, POS Tagging and Stopwords.

**Finding Structure of Documents:** Introduction, Methods, Complexity and Performance of Approaches. [8]

## UNIT-II

**Approaches:** Text features and TF-IDF classification, Bag of words, One-hot encoding, Word Vector- Glove and word2vec.

**Dimensionality Reduction:** Singular Vector Reduction (SVG), Principal Component Analysis (PCA), t-distributed stochastic neighbor embedding (t-SNE).

**Topic Modelling Approaches:** Latent Semantic Indexing (LSI), Latent Dirichlet Allocation (LDA).

**Document Similarity Matrices:** Jaccard Distance, Cosine Similarity, Mutual Information, Point wise Mutual Information, Entropy, Euclidian distance, Manhattan Distance. [8]

## UNIT-III

**Syntax Analysis:** Parsing Natural Language. Treebanks: Data-Driven approach to syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual issues.

**Semantic Parsing:** Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems and Software. [8]

## UNIT-IV

**Discourse Processing:** Cohesion, Reference Resolution, Discourse Cohesion and Structure.

**Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modelling, Problems, Multilingual and Cross lingual Language Modelling. [8]

## UNIT-V

**Knowledge Representation and Reasoning:** Local Discourse Context and Reference, Using World Knowledge, Discourse Structure, Defining a Conversational Agent.

**Applications:** Machine Translation, Information Retrieval and Extraction, Text Categorization and Summarization. [8]

## REFERENCES:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

3. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.
4. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, MA:, 1999.

# CA563 NEURAL NETWORK

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Neural Networks:** Terminology, Neural Network Architecture, Perceptrons, Linear Separability.  
**Perceptron Training Algorithm:** Termination Criteria, Choice of Learning Rate, Non-numeric Input.

**Modifications:** Pocket Algorithm, Adalines. [8]

## UNIT-II

**Supervised/Unsupervised Learning:** Prediction Networks, Winner-Take-All Networks, Hamming Networks, Max Net, Simple Competitive Learning, Counter Propagation, Neo Cognition.

**Associative Models:** Hopfield Network, Brain-State-in-a-Box Network, Boltzmann Machines. [8]

## UNIT-III

Multilayered Network Architecture, Back Propagation Algorithm, Heuristics for Making BP-Algorithm.

**Accelerated Learning BP:** Recursive Least Square, Quick Prop, RPROP Algorithm, Approximation Properties of RBF Networks, Comparison with Multilayer Perceptron. [8]

## UNIT-IV

Recurrent Network, Temporal Feed-forward Network, Implementation with BP, Self Organizing Map and SOM Algorithm, Properties of Feature Map and Computer Simulation, Principal Component, Independent Component Analysis, Application to Image and Signal Processing. [8]

## UNIT-V

Complex Valued NN, Complex Valued BP, Analyticity of Activation Function, Application in 2D Information Processing, Complexity Analysis of Network Models, Soft Computing, Neuro-Fuzzy-Genetic Algorithm Integration. [8]

## REFERENCES:

1. K. Mehrotra, Mohan, Ranka "Elements of Artificial Neural Networks", Penram International Publishing.
2. J.A. Anderson, "An Introduction to Neural Networks", MIT.
3. Hagen Demuth Beale, "Neural Network Design", Cengage Learning.
4. Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Pearson India.
5. Kosko, "Neural Network and Fuzzy Sets", PHI.
6. Hagan, "Neural Network Design w/CD", Cengage Learning.

# CA564 SOFT COMPUTING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Fuzzy Set Theory:** Introduction to Neuro, Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle, Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning, Fuzzy Modeling. [8]

## UNIT-II

**Optimization: Derivative-based** Optimization, Descent Methods, Steepest Descent Method, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Simulated Annealing, Random Search, Downhill Simplex Search. [8]

## UNIT-III

**Neural Networks:** Supervised Learning Neural Networks, Perceptrons, Adaline, Back Propagation Multilayer Perceptrons, Radial Basis Function Networks, Unsupervised Learning Neural Networks, Competitive Learning Networks, Kohonen Self-Organizing Networks, Learning Vector Quantization, Hebbian Learning. [8]

## UNIT-IV

**Neuro Fuzzy Modeling:** Adaptive Neuro, Fuzzy Inference Systems, Architecture, Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN, Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum. [8]

## UNIT-V

**Genetic Algorithm:** Fundamentals of Genetic Algorithms, Basic Concepts, Working Principle, Procedure of GA, Flow chart of GA, Genetic Representations, Encoding, Application of GA. [8]

## REFERENCES:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. K. Mehrotra, Mohan, Ranka "Elements of Artificial Neural Networks", Penram International Publishing.
5. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.

# CA565 VIRTUAL REALITY

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction to Virtual Reality:** Fundamental concept and components of Virtual Reality, Primary features and Present development in Virtual Reality, Modern experiences, Historical Perspective, Needs of VR, Bird's-Eye View, Hardware, Sensors, Displays, Software, Virtual World Generator, Game Engines, Human Senses, Perceptual Psychology, Psychophysics. Examples of VR Systems. [8]

## UNIT-II

**Multiple Models of Input and Output Interface in Virtual Reality****Input:** Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus and 3DScanner etc.

**Output:** Visual /Auditory / Haptic Devices. [8]

## UNIT-III

**Visual Computation in Virtual Reality:** Fundamentals of Computer Graphics, Software and Hardware technology on Stereoscopic Display.

**Advanced Techniques in Computer Graphics:** Management of Large Scale Environments and Real Time Rendering. [8]

## UNIT-IV

**Interactive Techniques in Virtual Reality:** Body Track, Hand Gesture, 3D Manus, Object Grasp.

**Development Tools and Frameworks in Virtual Reality:** Frameworks of Software Development Tools in VR, X3D Standard, Vega, MultiGen, Virtools etc. [8]

## UNIT-V

**Application of Virtual Reality in Digital Entertainment:** Virtual Reality Technology in Film and TV Production, Virtual Reality Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by Virtual Reality. [8]

## REFERENCES:

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.

# CA566 MOBILE COMPUTING

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

**L T P**  
**3 1 0**

## UNIT-I

**Introduction to Mobile Communications and Computing:** Introduction, Applications, Limitations and Architecture.

**Cellular Overview:** Cellular Networks, Cellular Concept, Channel Allocation, Location Management, Handoff.

**GSM:** Air-interface, Mobile Services. System Architecture: Radio Subsystem, Network and Switching Subsystem, Operation Subsystem.

**Protocols:** Localization and Calling, Handover. [8]

## UNIT-II

**Wireless LANs and Application:** WLAN, Wireless Standards, Wireless LAN, Infrared Vs Radio Transmission, Infrastructure Networks, Adhoc Networks, Wireless Applications, Mac Issues, Mobile IP.

**Wireless Application Protocol:** Architecture, Protocol Stack, Application Environment, IEEE Applications.

**Access Technologies:** Bluetooth, GPRS, 802.11, CDMA.

**Mobile Phone Technologies:** 1G, 2G, 2.5G, 3G. [8]

## UNIT-III

**Database Issues:** Hoarding Techniques, Caching Invalidation Mechanisms, Client Server Computing with Adaptation, Power-aware and Context-aware Computing, Transactional Models, Query Processing, Recovery, Quality of Service Issues. [8]

## UNIT-IV

**Mobile Ad-Hoc Networks (MANET):** Characteristics, Performance Issues, TCP Issues, Disconnected Operations, Data Broadcasting and Mobile Agents, Routing in Mobile Hosts.

**Routing Protocols:** Global State Routing (GSR), Destination Sequenced Distance Vector Routing (DSDV), Dynamic Source Routing (DSR), Ad Hoc on Demand Distance Vector Routing (AODV), Temporary Ordered Routing Algorithm (TORA), QoS in Ad Hoc Networks, Applications. [8]

## UNIT-V

**Platform/Operating Systems for Application Development:** Introduction to Palm OS, Windows CE, Embedded Linux, J2ME, Symbian.

**Android Application Development:** Overview of Android, Devices Running Android, Development Tools for Android, Features of Android, Architecture of Android, Libraries, Software Development Kit. [8]

## REFERENCES:

1. J. Schiller, "Mobile Communications", Addison Wesley Publication.
2. A.Mehrotra, "GSM System Engineering", Addison Wesley Publication.
3. M. Heijden, M. Taylor, "Understanding WAP", Artech House Publication.
4. Reto Meier, "Professional Android Application Development", Wrox Publications.

5. Ed Burnette, "Hello Android, Introducing Google's Mobile Development Platform", Pragmatic Programmers.
6. Lauren Dercy and ShandeConder, "SamsTeach Yourself Android Application Development", SamsPublishing.
7. Asoke K Talukdar, Roopa R. Yavagal, "Mobile Computing", TataMcGraw Hill.
8. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer.

# CAN01 CYBER SECURITY

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: NONE**

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**3 0 0**

## UNIT-I

**Introduction to Information Systems:** Types of Information Systems, Development of Information Systems, Introduction to Information Security, Need for Information Security, Threats to Information Systems, Information Assurance, Cyber Security and Security Risk Analysis.

**Fundamentals of E-Commerce:** Basic of E-Commerce, Types of E-Commerce, Benefits, Advantages and Disadvantages, Impact of E-Commerce on Business. [8]

## UNIT-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]

## UNIT-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]

## UNIT-IV

**Fundamentals of Cyber Law:** 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 License, Semiconductor Law and Patent Law, Cyber Laws in India: IT Act 2000 Provisions. [8]

## UNIT-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]

## REFERENCES:

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Bajaj and Nag, "E-Commerce: The Cutting Edge of Business", TMH.
3. Harish Chander, "Cyber Law and IT Protection", PHI Publication.
4. Merkov, Breithaupt, "Information Security", Pearson Education.
5. Farooq Ahmad, "Cyber Law in India", Pioneer Books.
6. K. K. Singh, Akansha Singh "Information Security and Cyber Law", Umesh Publication.



# CA567 MACHINE LEARNING WITH PYTHON PROGRAMMING LAB

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: CA552**

**L T P**

**0 0 3**

## **List of Experiments:**

1. Write a program to demonstrate different sequence datatypes provided in python.
2. Write a program to create, concatenate and print a string and accessing substring from a given string.
3. Write a python program to define a module and import a specific function in that module to another program.
4. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
5. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
6. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Python library classes can be used to write the program. Calculate the accuracy, precision and recall for your data set.
9. Write a program to implement  $k$ -Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

## CA568 WEB TECHNOLOGY LAB

w.e.f. Session 2021-22

**PREREQUISITE: NONE**

**COREQUISITE: CA553**

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**0 0 3**

1. Design a web page to display your CV.
  2. Design a HTML page using links, list, and table tag etc..
  3. Design a HTML form for railway reservation.
  4. Design a HTML form for user registration.
  5. In the form mentioned in problem 3 to reserve a railway ticket add the following validations using JavaScript.
    - From City A to City B.
    - Age of passengers should not be greater than 100.
    - Name of the passenger should be a string of a maximum length 20.
  6. In the form mentioned in problem 4 add validation using JavaScript.
  7. Write a JavaScript to prompt for username and display a welcome message and username.
  8. Write a program for illustrating client/server side scripting with help of ASP.
  9. Write a code in XML for creating DTD, which specifies set of rules.
  10. Create style sheets in CSS/XSL and display the document in Browser.
  11. Basic programs based on PHP.
  12. Basic programs based on AJAX.
- Mini Project:** Develop a web portal.

## **CA569 COMPUTER GRAPHICS LAB**

**w.e.f. Session 2021-22**

**PREREQUISITE: NONE**

**COREQUISITE: CA554**

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**0 0 2**

1. Implement the line drawing algorithm and circle drawing algorithm using midpoint line scan and midpoint circle scan algorithm.
2. Write a Program to implement line clipping algorithm.
3. Write a Program to implement 2D transformation.
4. Write a Program to implement 3D algorithm for parallel and perspective projection.
5. Write a Program to represent curve and surfaces.
6. Moving (animate) any 2D, 3D object along with the axis.
7. Application on Audio-Video mixing and clip making.
8. An outline of designing software like Photoshop and CorelDraw.
9. Introduction to Flash 5.0 creating a small animation using Flash 5.0.
10. Apply animation on text using 3D Cool.
11. Introduction to creating an animation using 3D studio Max R Animator pro/Video Studio/Scala 2000.