Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instructions and Examination
(Choice Based Credit System)
V SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	CS501PC	Theory of Computation	3	0	0	30	70	3	3
2	CS503PC	Design and Analysis of Algorithms	3	0	0	30	70	3	3
3	CS504PC	Software Engineering	3	0	0	30	70	3	3
4	CS507PC	Web Technologies	3	0	0	30	70	3	3
5	IT501PC	Data Communication and Computer Networks	3	1	0	30	70	3	4
6		Open Elective – I	2	0	0	30	70	3	2
7	MC501HS	Intellectual Property Rights	3	0	0	30	70	3	0
8	MC501ES	Artificial Intelligence	3	0	0	30	70	3	0
9	CS551PC	Software Engineering Lab	0	0	3	30	70	3	1.5
10	CS556PC	Computer Networks & Web Technologies Lab	0	0	3	30	70	3	1.5
11	EN553HS	Finishing School – III (Advanced Communication Skills)	0	0	2	30	70	3	1
		Total Hours / Marks / Credits	**23**	**1**	**8**	**330**	**770**	**-**	**22**

Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instructions and Examination
(Choice Based Credit System)
VI SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	IT601PC	Introduction to Embedded Systems	3	0	0	30	70	3	3
2	IT602PC	Internet of Things	3	0	0	30	70	3	3
3	CS604PC	Compiler Design	3	0	0	30	70	3	3
4		Professional Elective – I	3	0	0	30	70	3	3
5		Professional Elective – II	3	0	0	30	70	3	3
6		Open Elective – II	2	0	0	30	70	3	2
7	MC602ES	Cyber Security	3	0	0	30	70	3	0
8	IT651PC	Embedded Systems & IoT Lab	0	0	3	30	70	3	1.5
9	IT652PC	Compiler Design Lab	0	0	3	30	70	3	1.5
10		Professional Elective – II Lab	0	0	2	30	70	3	1
11	MA654BS	Finishing School – IV (Quantitative Aptitude & Analytical Ability)	0	0	2	30	70	3	1
		Total Hours / Marks / Credits	**20**	**0**	**10**	**330**	**770**	**-**	**22**

| 12 | MC601ESC | Environmental Science (For Lateral Entry Students) | 3 | 0 | 0 | 30 | 70 | 3 | 0 |

Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instruction and Examination
(Choice Based Credit System)
VII Semester

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1.	MS705HS	Organizational Behaviour	3	0	0	30	70	3	3
2.	IT701PC	Information Security	3	0	0	30	70	3	3
3.		Professional Elective – III	3	0	0	30	70	3	3
4.		Professional Elective – IV	3	0	0	30	70	3	3
5.		Open Elective – III	2	0	0	30	70	3	2
6.	IT751PC	Information Security Lab	0	0	2	30	70	3	1
7.		Professional Elective – III Lab	0	0	2	30	70	3	1
8.	IT752PC	Industry Oriented Mini Project / Summer Internship	0	0	4	-	100	-	2*
9.	IT753PC	Seminar	0	0	2	100	-	-	1
10.	IT754PC	Project Stage – I	0	0	4	30	70	-	2
Total Hours / Marks / Credits			**14**	**0**	**14**	**340**	**660**		**21**

*   Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit a report of Industrial Oriented Mini Project /Summer Internship for evaluation.

Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instruction and Examination
(Choice Based Credit System)
VIII - Semester

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	IT801PC	Data Mining	2	0	0	30	70	3	2
2		Professional Elective – V	3	0	0	30	70	3	3
3		Professional Elective – VI	3	0	0	30	70	3	3
4	IT851PC	Project Stage – II	0	0	16	30	70	-	8
Total Hours / Marks / Credits			**8**	**0**	**16**	**120**	**280**	**-**	**16**

Department of Information Technology
List of Professional Electives Offered :

Professional Elective – I :

IT611PE	Biometrics
IT612PE	Data Analytics
IT613PE	Principles of Programming Languages
IT614PE	Distributed Databases

Professional Elective – II :

IT615PE	Software Testing Methodologies
IT616PE	Python Programming
CS616PE	IT Operations – I
CS617PE	Devops

Professional Elective – III :

IT711PE	Machine Learning
IT712PE	Mobile Application Development
CS712PE	Full Stack Development
CS713PE	IT Operations – II

Professional Elective – IV :

IT713PE	Web & Database Security
IT714PE	Data Visualization
IT715PE	Quantum Computing
CS716PE	Cloud Computing

Professional Elective – V :

IT811PE	Intrusion Detection Systems
IT812PE	Augmented Reality & Virtual Reality
CS811PE	Social Networks Analysis
CS814PE	Adhoc & Sensor Networks

Professional Elective – VI :

IT813PE	Natural Language Processing
IT814PE	Human Computer Interaction
CS818PE	Neural Networks and Deep Learning
CS828PE	Blockchain Technology

Department of Information Technology

List of Open Electives Offered :

Open Elective – I :

IT521OE	Biometrics
IT522OE	Cyber Forensics
CS521OE	Data Structures

Open Elective – II :

IT621OE	Human Computer Interaction
CS621OE	Computer Networks
CS623OE	Java Programming

Open Elective – III :

IT721OE	Computer Graphics
CS721OE	Python Programming
CS723OE	Introduction to Machine Learning

Mahatma Gandhi Institute of Technology (Autonomous)
B.Tech. in Information Technology
Scheme of Instructions and Examination
(Choice Based Credit System)
V SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	CS501PC	Theory of Computation	3	0	0	30	70	3	3
2	CS503PC	Design and Analysis of Algorithms	3	0	0	30	70	3	3
3	CS504PC	Software Engineering	3	0	0	30	70	3	3
4	CS507PC	Web Technologies	3	0	0	30	70	3	3
5	IT501PC	Data Communication and Computer Networks	3	1	0	30	70	3	4
6		Open Elective – I	2	0	0	30	70	3	2
7	MC501HS	Intellectual Property Rights	3	0	0	30	70	3	0
8	MC501ES	Artificial Intelligence	3	0	0	30	70	3	0
9	CS551PC	Software Engineering Lab	0	0	3	30	70	3	1.5
10	CS556PC	Computer Networks & Web Technologies Lab	0	0	3	30	70	3	1.5
11	EN553HS	Finishing School – III (Advanced English Communication Skills Lab)	0	0	2	30	70	3	1
Total Hours / Marks / Credits			23	1	8	330	770	-	22

V Semester Syllabus
CS501PC: Theory of Computation
(Common to CSE and IT)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To classify machines by their power to recognize languages.
- To employ finite state machines to solve problems in computing.
- To understand deterministic and non-deterministic machines.
- To understand the differences between decidability and undecidability.

Course Outcomes:

- Able to understand the concept of abstract machines and their power to recognize the languages.
- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Able to gain proficiency with mathematical tools and formal methods.

UNIT – I :

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Deterministic Finite Automata: Definition of DFA, How a DFA Process Strings, The language of DFA.

Nondeterministic Finite Automata: Formal Definition, an application: Text Search, Conversion of NFA to DFA.

Finite Automata with Epsilon-Transitions: Formal Definition, epsilon-closure ,conversion of NFA with Є-transitions to DFA.

Moore and Melay machines : Definition of Moore and Melay machines, conversion of Melay to Moore machine and vice-versa.

UNIT – II :

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT – III :
Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tree, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Language of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT – IV :
Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating Unit productions, Eliminating Є-productions, Chomsky Normal form and Greibach Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications.

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's.

UNIT – V :
Turing Machines: Introduction to Turing Machine, Types of Turing machines, Formal Description, Instantaneous description, the language of a Turing machine, halting problem.

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines, Universal Turing machine.

Suggested Readings :
1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education.
2. K.L.P Mishra and N. Chandrashekaran,Theory of Computer Science – Automata, Languages and computation, 2nd Edition, PHI.

Reference Books:
1. John C Martin, Introduction to Languages and The Theory of Computation, TMH.
2. Daniel I.A. Cohen, John Wiley, Introduction to Computer Theory,
3. Michael Sipser ,Introduction to the Theory of Computation, , 3rd Edition, Cengage Learning.

V Semester Syllabus
CS503PC : Design And Analysis Of Algorithms
(Common to CSE, CSE(AI&ML),CSE(Data Science) & IT)

L	T	P	C
3	0	0	3

Prerequisites:
1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, greedy, Dynamic Programming, backtracking and branch and bound methods) and mention problems for which each technique is appropriate
- Describes how to evaluate and compare different algorithms using worst-, average-, and best case analysis.
- Explains the difference between tractable and intractable problems, and introduces the Problems that are P, NP and NP complete.

Course Outcomes:

Student will be able to:
- Acquire the knowledge of algorithm analysis and its notations that are applied on the problems solved by divide and conquer paradigm.
- Use greedy approach to solve an appropriate problem for optimal solution.
- Apply dynamic programming approach to solve suitable problems
- Apply the concept of back tracking, branch and bound paradigm for real time problems.
- Analyze the complexity of problems and differentiate that in terms of P and NP problems with examples.

Unit – I :
Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation.
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Unit – II :
Sets and Disjoint Set Unions: Introduction, Union and Find Operations with algorithms.
Greedy method: General method, applications-Job sequencing with dead lines, knapsack problem, Minimum cost spanning trees-Prim's and kruskal's Algorithm, Single source shortest path problem.

Unit – III :
Dynamic Programming: General method, applications- Multistage Graphs, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, The Traveling sales person problem, Reliability design.

Unit – IV :

Backtracking: General method, applications- The 8-Queens problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications - 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution, Travelling sales person problem,.

Unit – V :

NP-Hard and NP-Complete problems: Basic concepts, Nondeterministic algorithms, The classes NP - Hard and NP-Complete, Cook's theorem, NP-Hard Graph Problems-Clique Decision Problem(CDP), Node cover decision problem.

Suggested Readings :

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekharam, Fundamentals of Computer Algorithms, , Galgotia publications Pvt. Ltd, Second Edition, 2007.

2. Aho, Ullman and Hopcroft, Design and Analysis of algorithms, Pearson education, Reprint 2002.

Reference Books:

1. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.T Sai, Introduction to Design and Analysis of Algorithms A strategic approach, Mc Graw Hill,2005.

2. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

3. Introduction to Algorithms, 3rd Ed, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and Clifford Stein, PHI Pvt. Ltd., Pearson Education.

V Semester Syllabus
CS504PC: Software Engineering
(Common to CSE and IT)

L	T	P	C
3	0	0	3

Prerequisite: Object oriented Programming Language

Course Objectives:

- To understand different Software Process Models.
- To understand Software Requirements and SRS document.
- To understand different Software Architectural Styles.
- To understand different Software Testing Strategies and Methods.
- To understand Software Quality and metrics to ensure good quality software.

Course Outcomes:

- Ability to apply different Process Models.
- Ability to identify minimum requirements for the development of application.
- Ability to translate requirements to high level design models.
- Ability to conduct appropriate testing strategies and methods.
- Ability to measure software using metrics and conduct quality tasks.

UNIT – I :

Introduction to Software Engineering: The Evolving Role of Software, Changing Nature of Software, Software Myths.

A Generic View of Process: Software Engineering- A Layered Technology, A Process Framework, The Capability Maturity Model Integration (CMMI).

Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, The Unified Process.

UNIT – II :

Agile Development: Agility and Cost of Change, Agile Process, Extreme Programming, Scrum, DSDM.

Software Requirements: Functional and Non-Functional Requirements, User Requirements, System Requirements and the Software Requirements Document.

Requirements Engineering Process: Feasibility Studies, Requirements Elicitation and Analysis, Requirements Validation, Requirements Management.

UNIT – III :

System Modeling: UML modeling using Class diagram, Use case diagram, Sequence diagram and Activity Diagram.

Design Engineering: Design Process, Design Concepts, The Design Model.

Creating an Architectural Design: Software Architecture, Architectural Styles, Architectural Design. Modeling Component Level Design: Designing Class Based Components, Conducting Component Level Design. **User Interface Design**: Golden Rules, Interface Design Steps.

UNIT - IV :

Testing Strategies: A Strategic Approach to Software Testing, Test Strategies for Conventional Software: Unit Testing, Integration Testing, Validation Testing, System Testing, Art of Debugging, Testing Conventional Applications: White-Box Testing, Black-Box Testing.

UNIT – V :

Quality Management: Software Quality, Formal Technical Reviews, SQA Tasks, Goals, Metrics, Software Reliability.

Product Metrics: Framework for Product Metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

Suggested Readings :

1. Roger S Pressman, Software engineering a practitioner's Approach, Eighth Edition, McGraw Hill International Edition.
2. Ian Sommerville, Software Engineering, Seventh Edition, Pearson education.

Reference Books:

1. Waman S Jawadekar, An Engineering approach Software Engineering principles and practice- The Mc Graw-Hill Companies.
2. Meiler page-Jones, Fundamentals of object-oriented design using UML, Pearson Education.
3. James F. Peters, Witold Pedrycz, John Wiley, Software Engineering.

V Semester Syllabus
CS507PC : Web Technologies
(Common to CSE, IT and CSBS)

L	T	P	C
3	0	0	3

Prerequisites:

- A course on "Computer Programming and Data Structures".
- A course on "Java Programming"

Course Objectives:

- To introduce Client-side scripting with JavaScript and AJAX.
- To introduce PHP language for server-side scripting
- To introduce XML and processing of XML Data with Java
- To introduce Server-side programming with Java Servlets and JSP

Course Outcomes:

- Gain knowledge of client-side scripting, validation of forms and AJAX programming.
- Understand what is XML and how to parse and use XML Data with Java
- Understand server-side scripting with PHP language
- Gain knowledge of Server-side programming with Java Servlets
- Gain knowledge of Server-side programming with JSP.

UNIT – I :

HTML Common tags- List, Tables, images, forms, Frames, Cascading Style sheets.

Client-side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, Objects, Functions, event handlers (onclick, onsubmit etc.), HTML Document Object Model, Form validation, Introduction to AJAX.

UNIT – II :

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, XML-Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT – III :

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT – IV :

Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

UNIT – V :

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Scripting Elements, Directive Elements, Action Elements Implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP, Introduction to Content Management System(CMS).

Suggested Readings :

1. Web Technologies, Uttam K Roy, Oxford University Press

2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

Reference Books :

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech

2. Java Server Pages —Hans Bergsten, SPD O'Reilly,

3. Beginning Web Programming-Jon Duckett WROX.

V Semester Syllabus

IT501PC : Data Communication And Computer Networks

L	T	P	C
3	1	0	4

Course Objectives:

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

Course Outcomes:

- Students should be understand and explore the basics of Computer Networks.
- Students able to work on and Various Protocols.
- He / She will be in a position to understand the World Wide Web concepts.
- Students will be in a position to administrate a network and flow of information.
- He/she can understand easily the concepts of network security, Mobile and ad hoc networks.

Unit – I : Data Communications:

Components – Direction of Data flow – Networks-LAN, MAN, WAN, Internet – Components and Categories — Types of Connections — Topologies –Protocols and Standards — ISO / OSI model, TCP/IP Model, Example Networks such as ATM, Frame Relay, ISDN Physical layer: Data and Signals Digital Transmission, Analog Transmission, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

Unit – II : Data link layer:

Introduction, Framing-Character Stuffing, Bit Stuffing, and Error – Detection and Correction Types of Errors, Redundancy Detection Versus Correction, Forward Error Correction Versus Retransmission, – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels-Simplest Protocol, Stop-and-Wait Protocol, Noisy Channels-Stop-and-Wait Automatic Repeat Request, Go-Back-N Automatic Repeat Request, Selective Repeat Automatic Repeat Request. HDLC, Point to Point Protocols.

Medium Access Sublayer: Random access Protocols – ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled access protocols, Channelization. LAN – Ethernet IEEE 802.3, IEEE 802.5 — IEEE 802.11.

Unit – III: Network layer:

Logical Addressing, IPv4 Addressing,IPv6 Addressing, Internetworking, Tunneling, Address mapping, ARP,RARP, ICMP, IGMP, Delivery, Forwarding- Forwarding Techniques, Forwarding Process

Routing Table, Uni-Cast Routing Protocols- Optimization, Intra-and Inter domain Routing, Distance Vector Routing and RIP, Link State Routing and OSPF, Path Vector Routing and BGP, Unicast, Multicast, and Broadcast, Multicast Routing Protocols.

Unit – IV: Transport Layer:

Process to Process Delivery, UDP and TCP protocols, TCP Connection Management, Data Traffic, Congestion, Congestion Control Mechanisms, Congestion in Frame Relay, Congestion in TCP, QoS, Improving QOS-Priority Scheduling, Traffic Shaping, Integrated Services, Differentiated Services, QoSin Switched Networks.

Unit –V: Application Layer:

Domain name system, Name space-Flat Name Space, Hierarchical Name Space**,** Domain Name Space- Labels, Domain Name, Domain, DNS in internet-Generic Domains, Country Domains, Inverse Domain, electronic mail- Architecture, User Agent

Message Transfer Agent: SMTP**,** FTP, WWW-Client (Browser), Server, Uniform Resource Locator, HTTP, SNMP.

Suggested Readings :

1. Forouzan Behrouz A, " Data Communications and Networking", TMH, 2006, 4th Edition.
2. Tanenbaum Andrew S, " Computer Networks", Pearson Education, PHI, 4th Edition.

Reference Books:

1. Gupta P.C , "Data communications and Computer Networks", PHI.
2. Keshav S, "An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition.
3. Shay W.A Understanding communications and Networks, Cengage Learning, 3rd Edition
4. James F. & Keith W. Ross "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, 3rd Edition
5. William Stallings, "Data and Computer Communication", Pearson Education, 2000, 6th Edition

V Semester Syllabus
IT521OE : Biometrics (Open Elective – I)
(Except to CSE,IT,CSBS,CS(AI&ML), CS(Data Science)

L	T	P	C
2	0	0	2

Course Objectives:
- Will learn the biometric technologies.
- Learn the computational methods involved in the biometric systems.
- Learn methods for evaluation of the reliability and quality of the biometric systems..

Course Outcomes:
- Identify the various Biometric technologies.
- Design of biometric recognition for the organization.
- Develop simple applications for privacy.
- Understand the watermarking techniques of biometrics.
- Understand the research on biometric techniques.
- Understand the need of biometric in the society.

Unit – I : Introduction & Handwritten Character Recognition :

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods, character Recognition, System Overview, Gesture Extraction for character Recognition, Neura: Network for handwritten Character Recognition, Multilayer Neural Network for Handwritten Character Recognition, Devanagari Numeral Recognition, Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden Markov Model.

Unit – II : Face Biometrics & Retina and Iris Biometrics :

Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics, Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages. Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition for Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

Unit– III : Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics :

Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy

Soft Biometrics - Introduction to Biometric Cryptography, General Purpose Cryptosystem, Modern Cryptography and Attacks, Symmetric Key Ciphers, Cryptographic Algorithms

Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics Characters, AADHAAR : An Application of Multimodal Biometrics.

Unit – IV : Watermarking Techniques & Biometrics :

Scope And Future Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics -Biometrics, and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometric, Radio Frequency Identification Biometrics, DNA Biometrics, Comparative Study of Various Biometrics Techniques.

Unit – V : Image Enhancement Techniques & Biometrics Stands :

Introduction, current Research in image Enhancement Techniques, Image Enhancement, Frequency Domain Filters, Databases and Implementation, Standard Development Organizations, Application Programming Interface, Information Security and Biometric Standards, Biometric Template Interoperability.

Suggested Readings :

1.   G R Sinha and Sandeep B. Patil, "Biometrics: concepts and applications", Wiely, 2013.
2.   Paul Reid, "Biometrics for Network Security", Pearson Education.

Reference Books:

1.   Samir Nanavathi, Micheal Thieme and Raj Nanavathi, "Biometrics, Identity verification in a networked World", Wiley, dream Tech.
2.   John D. Woodward and Jr. Wiley, "Biometrics, The Ultimate Reference.", Dreamtech

L	T	P	C
2	0	0	2

V Semester Syllabus

IT522OE : Cyber Forensics (Open Elective – I)
(Except to CSE,IT,CSBS,CS(AI&ML), CS(Data Science)

Course Objectives :

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has indifferent kinds of crimes.

Course Outcomes :

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

Unit – I : Introduction of Cybercrime :

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology — Steps - Activities in Initial Response, Phase after detection of an incident

Unit – II : Initial Response and forensic duplication :

Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system — Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

Unit – III : Forensics analysis and validation :

Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

Unit – IV : Current Forensic tools :

Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software

E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

Unit – V : Working with Windows and DOS Systems :

Understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines

Suggested Readings :

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.

2. John R. Vacca, "Computer Forensics, Computer Crime Investigation", Firewall Media, NewDelhi.

3. Nelson, Phillips Enfinger, Steuart, "Computer Forensics and Investigations", CENGAGE Learning

Reference Books:

1. Keith J. Jones, Richard Bejtiich, Curtis W. Rose, "Real Digital Forensics", Addison-Wesley Pearson Education

2. Tony Sammes and Brian Jenkinson, "Forensic Compiling, A Tractitioneris Guide", Springer International edition.

V Semester Syllabus
CS521OE: Data Structures (Open Elective - I)
(Except to CSE,IT,CSBS,CS(AI&ML), CS(Data Science)

L	T	P	C
2	0	0	2

Prerequisites: Any programming language
Course Objectives :

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as trees and graphs
- Understand the concepts of heaps and tries.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

Student will be able to:
- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Describe the hash function and concepts of collision and its resolution methods.
- Understand, design and implement the general tree data structures with their applications.
- Solve problem involving graphs, trees and heaps.
- Implement and know the application of algorithms for sorting and pattern matching

Unit – I :

Introduction: Data structures-definition and types, Static and Dynamic representation of data structure and comparison. **Stack:** definition, operations on stacks, Notations- Infix, Prefix and Postfix representation. Infix to Postfix conversion example. Evaluation of Postfix expression example.

Unit – II :

Hashing: Hash Functions, collision resolution techniques- Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing. Rehashing, Extensible Hashing.

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion and searching.

Unit – III :

Trees: Basic terminology, Types of trees: Binary Tree, Complete and Full Binary Tree, Extended Binary Trees, Threaded Binary Trees. **Search Trees**: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, Splay Trees-Insertion.

Unit – IV :

Graphs-Basic terminology, Representation of graphs, **Graph Traversals**-Breadth First Search, Depth First Search with algorithms.

Sortings: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

Unit – V :

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries

Suggested Readings :

1. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publications Pvt Ltd Delhi India.
2. Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C and C++, PHI Learning Private Limited, Delhi India.

Reference Books:

1. Richard F.Gillberg & Behrouz A. Forouzan, Data Structures, A Pseudo code Approach with C, Second Edition, Cengage Learning, India Edition, 2005.
2. Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C and C++, PHI Learning Private Limited, Delhi India.
3. Seymour Lipschutz, Schaum's Outlines ,Data Structures, Special Second Edition,Tata McGraw-Hill,.

V Semester Syllabus
MC501HS: Intellectual Property Rights
(Common to CSE, CSBS, CSD, CSE (AI&ML)& IT)

L	T	P	C
3	0	0	0

Course Objectives :

- To enable the students to have an overview of Intellectual Property Rights
- To provide comprehensive knowledge to the students regarding Trademarks Registration process and law related to it.
- To disseminate knowledge on Copyrights, its related rights and recent developments.
- To make the students understand Patent Regime in India and abroad.
- To understand the framework of Trade secrets

Course Outcomes: After completion of the course students will be able to:

- Gain knowledge on Intellectual property rights and their importance.
- Understand Indian and international Trademark Law and procedure for registration of Trademarks.
- Acquire knowledge on Copyright Law, and the privileges awarded to the copyright owners.
- Familiarized with the process of acquiring the patent and relevant laws.
- Learn the importance of trade secrets for business sustainability.

Unit – I : Introduction to Intellectual property

Introduction of IPR-Meaning of intellectual property, types of intellectual property-trademarks, copyrights, patents, trade secrets, importance of intellectual property rights, International organizations-WTO-WIPO-USPTO-INTA, International Conventions, agencies and treaties- Paris Convention-Berne Convention- Madrid Protocol-NAFTA-PCT-GATT-TRIPS.

Unit – II : Trademarks

Trademarks : Purpose and functions of Trademarks-Categories of marks, acquisition of Trademark rights - Protectable matter - Selecting and evaluating Trademark- Trademarks registration process – Trademark Infringement - Remedies for infringement in Trademarks-New developments in Trademark Law- International Trademarks Law.

Unit – III : Copyright

Copyrights -Fundamental of Copyright Law -Requirements of Copyrightability- Originality of material, fixation of material, Authorship works, exclusions from copyright protection-Rights of Copyright Owner-Right of reproduction of copyrighted work, right to do derivative works ,right to distribute copies of the copyrighted work, right to perform the work publicly, right to display the copyrighted work, – Copyright Ownership issues – Joint Works, Works made for Hire, Specially commissioned works, Copyright Registration - Notice of Copyright – Copyright Infringement -

Remedies for infringement in Copyrights- New developments in Copyright Law-International Copyright Law.

Unit – IV : Patents

Patents : Concept of Patent - Classification – Utility Patents – Design Patents and Plant Patents, Patent searching process-Types of Patent Applications-Patent Registration Process, Ownership, Transfer, Assignment and Licensing of Patent-Patent Infringement, Remedies for Infringement of Patents, New developments in Patent Law- International Patent Law.

Unit – V: Trade Secrets & Law of Unfair Competition

Trade Secrets : Trade secret law, determination of trade secrete status, measures for protecting trade secret status-Liability for misappropriations of trade secrets, protection for submissions, trade secret litigation. New developments in Trade secrets Law- International Trade Secrets.

Law of Unfair competition: Passing off, Misappropriation, right of publicity, dilution of trademarks, product disparagement, false advertising.

Suggested Readings :

1. Deborah. E. Bouchoux, Intellectual property, 4 e,Cengage learning India Pvt.Ltd., 2013
2. Prabuddha Ganguli, Intellectual property right, 8e,Tata McGraw Hill Publishing company, 2016
3. Dr.B.L.Wadehra, Law Relating to Intellectual Property,5 e, Universal Law Publishing Co. 2011.

Reference Books :

1. Richard Stim, Intellectual Property, 3e Cengage learning India Pvt.Ltd., 2017
2. Vinod.V.Sopele, Asoka K.Ghosh,Managing Intellectual Property, 2 e,2010
3. Ananth Padmanabhan, Intellectual Property Rights – Infringement and Remedies, Lexis Nexis Publishers, 2012

V Semester Syllabus
MC501ES/ MC601ES: Artificial Intelligence
(Common to all Branches except CSE(AI&ML))

L	T	P	C
3	0	0	0

Course Objectives :

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes :

- Ability to formulate an efficient problem space for a problem expressed in natural language.
- Select a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem.
- Possess the ability to apply AI techniques to solve problems of game playing, and machine learning

Unit – I :

Introduction: AI Definition, Agents and Environments, Structure of Agents, Types of Agents. Problem Solving Agents: Problem spaces, states, goals and operators.

Uninformed Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening depth first search, Bidirectional Search.

Unit – II :

Informed Search: Heuristic Search strategies, Hill Climbing, A*, Hill climbing search.

Game Playing: Adversarial Searches. Two player games. Min-max Search: Algorithm, Problems. Draw Back of Min-Max Algorithm. Alpha-beta pruning: Algorithm, Problems.

Constraint Satisfaction Problems: Definition, Crypt-Arithmetic Problems, Map Coloring, Backtracking.

Unit – III :

Basic Knowledge Representation and Reasoning: Propositional Logic: Basics of logic, truth tables and sentence conversions. First order logic: Difference between Proposition & First order logic. Conjunctive Normal form. Disjunctive Normal Form. Conversion of English sentences into First order logic. Resolution and theorem proving. Problems of Resolution. Forward Chaining: Definition, Example problems. Backward Chaining: Definition, Example problems.

Unit – IV :

Planning Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. **Planning and Acting in the Real World:** Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

Unit – V :

Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees.

Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

Suggested Readings :

1. Artificial Intelligence: A Modern Approach by S. Russell and P. Norvig, Prentice Hall. 2010, third edition.
2. Artificial Intelligence by Elaine Rich, Kevin Knight and Shivashankar B Nair, Tata McGraw Hill.

Reference Books:

1. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Pearson Education.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education

V Semester Syllabus
CS551PC: Software Engineering Lab

L	T	P	C
0	0	3	1.5

(*Common to CSE,IT*)

Prerequisites: Object Oriented Programming Language

Course Objectives :

- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes

- Ability to translate requirements into System Models.
- Ability to generate a high-level design of the system from the software requirements.
- Understand different Software Testing Methodologies and design suitable test cases.
- Ability to prepare documentation using Computer Aided Software Engineering Tool.

List of Experiments

Do the following Exercises of any two projects given in the list of sample project so on any other projects:

1) Development of problem statement.
2) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3) PreparationofSoftwareConfigurationManagementandRiskManagementrelateddocuments.
4) Study and usage of any Design phase CASE tool
5) Performing the Design by using any Design phase CASE tools.
6) Develop test cases for unit testing and integration testing
7) Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Suggested Readings :

1. Software Engineering, A practitioner's Approach – Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, PearsonEducation.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, PearsonEducation.

V Semester Syllabus
CS556PC: Computer Networks & Web Technologies Lab
(Common to IT & CSBS)

L	T	P	C
0	0	3	1.5

Course Objectives :

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and observe its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes :

- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

List of Experiments

COMPUTER NETWORKS Experiments :

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i.   Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i.   NS2 Simulator-Introduction
    ii.   Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv.   Simulate to Find the Number of Packets Dropped due to Congestion
    v.   Simulate to Compare Data Rate& Throughput.
    vi.   Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

WEB TECHNOLOGIES Experiments :

1. Write a PHP script to print prime numbers between 1-50.

2. PHP script to a. Find the length of

   a. string.

   b. Count no of words in a string.

   c. Reverse a string.

   d. Search for a specific string

3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.

4. Write a PHP script that reads data from one file and write into another file.

5. Develop static pages (using Only HTML) of an online book store. The pages should resemble:

   www.amazon.com. The website should consist the following pages.

   a) Home page

   b) Registration and user Login

   c) User Profile Page

   d) Books catalog

   e) Shopping Cart

   f) Payment By credit card

   g) Order Conformation

6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

Suggested Readings :

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

Reference Books:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.

2. J2EE: The complete Reference By James Keogh, McGraw-Hill

3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson

4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8th Edition

5. Web technologies, Black Book, Dreamtech press.

6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

V Semester Syllabus

EN553HS: Finishing School – III

(Advanced English Communication Skills Lab)

(Common to CSE, IT, CSB, CSM, and CSD)

L	T	P	C
0	0	2	1

Course Objectives :

This Lab focuses on using multi-media instruction for language development to meet the various needs of the students. The objectives of the course are as follows:

- To improve students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- To enable them to communicate their ideas relevantly and coherently in writing.
- To facilitate placement activities for the students.
- To make the students participate in both oral as well as written presentation skills.
- To equip the students to be efficient in Group Discussions, Presentation Skills and Interview Skills.

Course Outcomes :

Students will be able to:

- Acquire English language vocabulary and use it contextually
- Listen and speak effectively in English language
- Develop proficiency in academic reading and writing skills
- Increase possibilities of job prospects in their respective domain
- Communicate confidently in formal and informal contexts

INTRODUCTION:

Advanced English Communication Skills Lab is considered essential as the students need to prepare themselves for their careers which may require them to listen, speak, read and write in English both for their professional and interpersonal communication in the globalized context. This course would enable students to use English effectively and perform the following:

1. Gathering ideas and information to organize ideas relevantly and coherently.
2. Participating in group discussions.
3. Facing interviews.
4. Writing project/research reports/technical reports.
5. Making oral presentations.
6. Writing formal letters.
7. Transferring information from non-verbal to verbal texts and vice-versa.
8. Taking part in social and professional communication.

Unit – I :

Inter-personal Communication – Building General, Technical and Business English

Vocabulary – Formal meeting–planning and circulating agenda–opening the meeting–during the meeting–closing the meeting-responding appropriately and relevantly – using the right body language-general-technical-business- vocabulary, analogy.

Unit – II :

Reading Comprehension: Reading for facts-skimming-scanning-guessing meanings from context, inferring meaning, critical reading, effective online navigation, sample passages from TOEFL/GRE/IELTS.

Unit – III :

Writing Skills: Planning for writing, structure and presentation of different types of writing – letter writing/resume writing, email netiquette, project report writing – feasible/business/ periodical/academic reports.

Unit – IV :

Presentation Skills: Brief speeches-introduction to a structured talk**– o**ral presentations (individual and group) /PPTs, gambits of presentation skills – use of tag questions, summarising after a brief talk, opening/during/concluding a presentation.

Unit – V :

Group Discussion and Interview Skills: Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation - concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and mock interviews.

Suggested Readings :

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition

2. Academic Writing: A Hand book for International Students by Stephen Bailey, Routledge, 5th Edition.
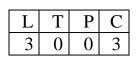
Reference Books:

1. Learn Correct English–A Book of Grammar, Usage and Composition by ShivK.Kumar and Hemalatha Nagarajan. Pearson 2007

2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt.Ltd, 2016.

3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

4. Technical Communication by PaulV.Anderson.2007.Cengage Learning pvt.Ltd. New Delhi.

5. English Vocabulary in Use series, Cambridge University Press2008.

6. Handbook for Technical Communication by David A.McMurrey & Joanne Buckley.2012.Cengage Learning.

7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi,2009.

8. Job Hunting by Colm Downes, Cambridge University Press2008.

9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata McGraw-Hill 2009

10. How to Write and Speak Better, Reader's Digest, 2003

11. Cambridge IELTS 16 Academic student's book with answers, 2017

12. TOEFL Reading & Writing Workout, The Princeton Review.

13. GRE Reading Comprehension: Detailed Solutions to 325 questions. Vibrant Publishers, 2017

14. How to prepare for Group Discussions and Interviews by Harimohan Prasad and Rajneesh Prasad, Tata Mc Graw Hill.

15. Keep Talking, Frederick Klippel, Cambridge University Press, South Asian edition (6 May 2010),

16. Objective English, Edgar Thorpe & Showick Thorpe, Pearson; 5th edition (1 August 2013).

Mahatma Gandhi Institute of Technology (Autonomous)
B.Tech. in Information Technology
Scheme of Instructions and Examination
(Choice Based Credit System)
VI SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	IT601PC	Introduction to Embedded Systems	3	0	0	30	70	3	3
2	IT602PC	Internet of Things	3	0	0	30	70	3	3
3	CS604PC	Compiler Design	3	0	0	30	70	3	3
4		Professional Elective – I	3	0	0	30	70	3	3
5		Professional Elective – II	3	0	0	30	70	3	3
6		Open Elective – II	2	0	0	30	70	3	2
7	MC602ES	Cyber Security	3	0	0	30	70	3	0
8	IT651PC	Embedded Systems & IoT Lab	0	0	3	30	70	3	1.5
9	IT652PC	Compiler Design Lab	0	0	3	30	70	3	1.5
10		Professional Elective – II Lab	0	0	2	30	70	3	1
11	MA654BS	Finishing School – IV (Quantitative Aptitude & Analytical Ability)	0	0	2	30	70	3	1
Total Hours / Marks / Credits			**20**	**0**	**10**	**330**	**770**	**-**	**22**
12	MC601ESC	Environmental Science (For Lateral Entry Students)	3	0	0	30	70	3	0

L	T	P	C
3	0	0	3

VI Semester Syllabus

IT601PC : Introduction To Embedded Systems

Prerequisites

1. A course on "Digital Logic Design and Microprocessors"
2. A course on "Computer Organization and Architecture"

Course Objectives:

- To provide an overview of principles of Embedded System.
- To provide an overview of 8051 microcontroller
- To provide a clear understanding of role of firmware, operating systems in correlation with hardware systems.

Course Outcomes:

- Expected to understand the selection procedure of processors in the embedded domain.
- Understand programming of 8051 microcontroller.
- Design procedure of embedded firm ware.
- Expected to visualize the role of real-time operating systems in embedded systems.
- Expected to evaluate the correlation between task synchronization and latency issues

Unit – I: Introduction to Embedded Systems :

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Unit – II: Typical Embedded System :

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators- Light Dependent Resistor, Thermistor, Photo Transistor, Light Emitting Diode, Relays, Stepper Motor. Communication Interfaces: SPI, I2C, UART, Onboard and External Communication Interfaces: WiFi, Bluetooth, ZigBee, USB

Unit – III: Other System Components of Embedded system :

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches: Super Loop Based Approach and OS based Approach, Development Languages: Assembly Language and High level Language

Unit – IV: RTOS Based Embedded System Design :

Operating System Basics, Types of Operating Systems-GPOS, RTOS, Tasks, Task States, Task Control Block, Process and Threads, Multiprocessing and Multitasking

Task Scheduling- Non-Preemptive Scheduling (FCFS, LCFS, SJF, Priority Based), Preemptive Scheduling(FCFS, LCFS, SJF, Priority Based, Round-Robin).

Unit – V: Task Communication :

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Communication/Synchronization Issues: Racing, Deadlock, Livelock, Starvation, Task Synchronization Techniques: Mutual exclusion through busy waiting/ Spin lock, Mutual exclusion through Sleep and Wakeup, Semaphores, Device Drivers, Methods to Choose an RTOS.

Suggested Readings :

1. Shibu K.V, "Introduction to Embedded Systems", McGrawHill.

Reference Books :

1. RajKamal, "Embedded Systems",TMH.
2. Frank Vahid, Tony Givargis, "Embedded Systems Design: A Unified Hardware / Software Introduction", John & Wiley Publications, 2002.
3. Lyla B. Das, "Embedded Systems",Pearson,2013.
4. David E. Simon, "An Embedded Software Primer", Pearson Education

VI Semester Syllabus
IT602PC : Internet of Things

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the terminology, technology and its applications.
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT device
- To introduce the Raspberry Pi platform, that is widely used in IoT applications.
- To introduce the implementation of web based services on IoT devices

Course Outcomes:

- Understand the IoT Systems.

- Understand the concept of M2M (machine to machine) with necessaryprotocols

- Create programs using python scripting language in IoT devices.

- Create programs for Raspberry Pi interfaces.

- Understand to communicate with IoT Systems through web-interface

- Apply IoT principles for domain specific applications

Unit – I: IoT Introduction :

Introduction to Internet of Things: Definition and Characteristics of IoT

Physical& Logical Design of IoT: Things in IoT, IoT Protocols, IoTFunctional Blocks, IoT Communication Models, IoT Communication APIs, **IoT enabled Technologies**: Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, **IoT Levels:**IoT Level-1, IoT Level-2, IoT Level-3, IoT Level-4, IoT Level-5, IoT Level-6

Domain Specific IoTs: Home Automation, Cities, Environment, Energy, Retail- Logistics, Agriculture, Industry, Health &Lifestyle.

Unit –II : IoT Concepts :

IoT and M2M- Introduction M2M, Difference between IoT and M2M, **SDN and NFV for IoT**- Software Defined Networking, Network Function Virtualization, **IoT System Management with NETCONF - YANG -** Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, **IoT Systems Management with NETCONF-YANG-** NETOPEER

Unit – III : IoT Systems - Logical Design using Python :

Introduction, Installing Python, **Python Data Types & Data Structures**: Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions, **Control Flow**- if, for, while, range, break/continue, pass, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes

Python Packages of Interest for IoT –JSON, XML, HTTPLib & URLLib, SMTPLib

Unit – IV : IoT Physical Devices &Endpoints :

What is an IoT Device- Basic building blocks of an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, **Raspberry Pi Interfaces** – Serial, SPI, I2C, **Programming Raspberry Pi with Python** - Controlling LED with Raspberry Pi, Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, **Other IoT Devices**- pcDuino, BeagleBone Black

Unit – V : IoT Physical Servers & Cloud Offerings :

Introduction to Cloud Storage Models & Communication APIs, WAMP – Auto Bahn for IoT ,Xively Cloud for IoT, Designing a RESTful Web API, **Amazon Web Services for IoT**- Amazon EC2, Amazon AutoScaling, Amazon S3, Amazon RDS, Amazon Dynamo DB, Amazon Kinesis, Amazon SQS, Amazon EMR, SkyNetIoT Messaging Platform

Suggested Readings :

1. ArshdeepBahga and Vijay Madisetti, "Internet of Things - A Hands-on Approach", UniversitiesPress, 2015, ISBN: 9788173719547.
2. Matt Richardson and Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD),2014, ISBN: 9789350239759.

Reference Books :

1. David, Hanes and Salgueiro Gonzalo, "IoT Fundamentals: Networking Technologies, Protocolsand Use Cases for the Internet of Things", Pearson 2017.
2. Dirk Slama and Frank Puhlmann, "Enterprise IoT: Strategies and Best Practices for ConnectedProducts and Services", 2015.

VI Semester Syllabus
CS604PC: Compiler Design
(Common CSE, IT, CSE (Data Science))

L	T	P	C
3	0	0	3

Course Objectives :

- To understand the various phases in the design of acompiler.
- To understand the design of top-down and bottom-upparsers.
- To understand syntax directed translationschemes.
- To introduce lex and yacctools.
- To learn to develop algorithms to generate code for a targetmachine.

Course Outcomes :

- Ability to design, develop, and implement a compiler for anylanguage.
- Able to use lex and yacctools for developing a scanner anda parser.
- Able to design and implement LL and LRparsers.
- Able to design algorithms to perform code optimization in order to improvethe performance of a program in terms of space and timecomplexity.
- Ability to design algorithms to generate machinecode.

Unit – I :

Introduction: Language Processors, The Structure of a compiler, Phases of Compilation, Language Processing System, the Science of building a compiler, programming language basics.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Design of a Lexical-Analyzer Generator.

Unit –II :

Syntax Analysis: Introduction, writing a Grammar- Lexical Versus Syntactic Analysis, Eliminating Ambiguity, Elimination of Left Recursion, Left Factoring.Top-Down Parsing –Problems of Top-down Parsing, Recursive descent Parsing, Back Tracking-Brute Force Method, Non-Recursive Predictive Parsing, LL (1) Grammar.

Bottom-Up Parsing: Introduction to LR Parsing: Shift reduce Parsing, Operator Precedence Grammar, Simple LR, More Powerful LR Parsers, Look Ahead LR, Using Ambiguous Grammars, Parser Generators-YACC.

Unit – III :

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Three-Address Code Representations – Triples, Quadruples, Indirect Triples. Conversion of Popular Programming Languages Constructs into Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back Patching.

Unit – IV :

Run-Time Environments: Storage organization**,** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Mark-and-sweep Garbage Collection Algorithm, Introduction to Trace-BasedCollection.

Code Generation: Object Code Forms**,** Machine Dependent Code Optimization, DAG Representation of Basic Blocks, Optimization of Intermediate Code by DAG, Issues in the Design of a Simple Code Generator, The Target Language, addresses in the Target Code, Code Generation Algorithm, Code Generation by DAG, Peephole Optimization, Register Allocation and Assignment.

Unit – V :

Machine-Independent Optimizations: The Principal Sources of Optimization - Constant Folding, Copy Propagation, Dead Code Elimination, Algebraic Transformation, Strength reduction, Common Sub Expression Elimination. Loop Optimization Techniques – Loop Invariant Code Motion, Strength Reduction on induction variable, Loop Unrolling.

Basic Blocks and Flow Graphs: Local Optimization, Global Optimization, Data Flow Properties: Available Expressions, Reaching Definition, Live Variable Analysis.

Suggested Readings :

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson Education, 2011.
2. Principles of Compiler Design by V Raghavan Mcgraw Hill Education, 2017.

Reference Books :

1.   Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning, 1970.
2.   The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH, 1985.
3.   Writing compilers and interpreters, R. Mak, 3rd edition, Wiley studentedition.lex & yacc – John R. Levine, Tony Mason, Doug Brown,O'reilly, 1992.

VI Semester Syllabus
IT611PE : Biometrics
(Professional Elective – I)

L	T	P	C
3	0	0	3

Course Objectives:

- Will learn the biometric technologies.
- Learn the computational methods involved in the biometric systems.
- Learn methods for evaluation of the reliability and quality of the biometric systems.

Course Outcomes:

- Identify the various Biometric technologies.
- Design of biometric recognition for the organization.
- Develop simple applications for privacy.
- Understand the watermarking techniques of biometrics.
- Understand the research on biometric techniques.
- Understand the need of biometric in the society..

Unit – I: Introduction & Handwritten Character Recognition :

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods, character Recognition, System Overview, Gesture Extraction for character Recognition, Neura: Network for handwritten Character Recognition, Multilayer Neural Network for Handwritten Character Recognition, Devanagari Numeral Recognition, Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden Markov Model.

Unit –II: Face Biometrics & Retina And Iris Biometrics :

Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics, Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages. Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition for Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

Unit – III: Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics :

Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics - Introduction to Biometric Cryptography, General Purpose Cryptosystem, Modern Cryptography and Attacks, Symmetric Key Ciphers, Cryptographic Algorithms, Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics andAdvantages of Multimodal Biometrics Characters, AADHAAR : An Application of Multimodal Biometrics.

Unit – IV: Watermarking Techniques &Biometrics :

Scope And Future Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics -Biometrics, and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometric, Radio Frequency Identification Biometrics, DNA Biometrics, Comparative Study of Various Biometrics Techniques.

Unit – V: Image Enhancement Techniques & Biometrics Stands :

Introduction, current Research in image Enhancement Techniques, Image Enhancement, Frequency Domain Filters, Databases and Implementation, Standard Development Organizations, Application Programming Interface, Information Security and Biometric Standards, Biometric Template Interoperability.

Suggested Readings :

1. G R Sinha and Sandeep B. Patil, "Biometrics: concepts and applications", Wiely, 2013.
2. Paul Reid, "Biometrics for Network Security", Pearson Education.

Reference Books:

1. Samir Nanavathi, MichealThieme and Raj Nanavathi, "Biometrics, Identity verification in a networked World", Wiley, dream Tech.
2. John D. Woodward and Jr. Wiley, "Biometrics, The Ultimate Reference.", Dreamtech

VI Semester Syllabus
IT612PE : Data Analytics
(Professional Elective – I)

L	T	P	C
3	0	0	3

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To understand various Data sources and its Business Implications
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate theaccuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes:

After completion of this course students will be able to
- Understand the impact of data analytics for business decisions and strategy
- Carry out data analysis/statistical analysis
- To carry out standard data visualization and formal inference procedures
- Design Data Architecture
- Understand various Data Sources

Unit – I: Data Management :

Design Data Architecture and manage the data for analysis, , understand various sources, **Internal Source, External Source** , Data like Sensors/Signals/GPS etc.Data Types, Methods of collecting data, Data Management, benefits of data management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing, Data Cleaning, Data Transformation, Data Reduction

Unit – II: Data Analytics:

Introduction to Analytics, Introduction to Tools and Environment, R Language, Python ,SPSSetc, Need for Business Modeling , Key Responsibilities of a Business Analyst ,Purpose of business Modeling, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Conceptual, Logical, Physical Data Model ,Missing imputations, MCAR,MAR,MNAR.

Unit – III: Regression :

Concepts, Blue property assumptions ,Linear regression, Logistic regression, , Least Square Estimation, Variable Rationalization, and Model Building etc.
Logistic Regression: Binary ,Multinomial regression, Model Theory, Model fit Statistics, Maximum Likelihood Estimation(MLE),Model Construction, Analytics applications to various Business Domains, Finance, marketing, credit card companies.

Unit – IV: Object Segmentation:

Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction.

Unit – V:Data Visualization:

Importance of Data Visualization, Data Visualization techniques, Box plots, histograms, charts, tree maps, Pixel- Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

Suggested Readings :

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

Reference Books:

1. Tan, Steinbach and Kumar, "Introduction to Data Mining", AddisionWisley, 2006.
2. M. Zaki and W. Meira, "Data Mining Analysis and Concepts"
3. Jure Leskovec Stanford Univ. Anand Rajaraman MilliwayLabsJeffrey D Ullman Stanford Univ. "Mining of Massive Datasets, "

VI Semester Syllabus
IT613PE: Principles Of Programming Languages
(Professional Elective – I)

L	T	P	C
3	0	0	3

Course Objectives:

- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation
- Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages and scripting languages

Course Outcomes:

- Acquire the skills for expressing syntax and semantics informal notation
- Identify and apply a suitable programming paradigm for a given computing application
- Gain knowledge of and able to compare the features of various programming languages

Unit – I: Preliminary Concepts:

Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade- Offs, Implementation Methods, Programming Environments

Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

Unit – II: Names, Bindings, and Scopes:

Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence

Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures : Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

Unit – III: Subprograms and Blocks:

Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines

Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction,Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

Unit – IV: Concurrency:

Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency.

Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++,Java, Introduction to Event Handling, Event Handling with Java and C#.

Unit – V: Functional Programming Languages:

Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study : Python –Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.(TextBook2)

Suggested Readings :

 1. Robert. W. Sebesta , "Concepts of Programming Languages", 10th Edition, Pearson Education.
 2. D.A.Watt, "Programming Language Design Concepts", Wiley Dreamtech, 2007.

Reference Books:

1. A.B.Tucker, R.E.Noonan, "Programming Languages", TMH, 2[nd]Edition
2. K.C.Louden, "Programming Languages", Thomson, 2003, 2nd Edition

VI Semester Syllabus
IT614PE : Distributed Databases
(Professional Elective – I)

L	T	P	C
3	0	0	3

Course Objectives :

- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation
- Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages and scripting languages

Course Outcomes :

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database system.
- Understand the design aspects of object-oriented database system and related development.
- Demonstrate use of the relational algebra operations from mathematical set theory and the relational algebra operations developed specifically for relational databases
- Understand a set of query processing strategies and select the optimal strategy.

Unit – I : Introduction :

Introduction; Distributed Data Processing, Distributed Database System,

Promises of DDBSs: Transparent Management of Distributed and Replicated Data, Reliability Through Distributed Transactions, Improved Performance, Easier System Expansion, Problem areas.

Distributed DBMS Architecture : ANSI / SPARC Architecture, A Generic Centralized DBMS Architecture , Architectural Models for Distributed DBMSs, Autonomy , Distribution , Heterogeneity , Architectural Alternatives, Client/Server Systems , Peer-to-Peer Systems , Multi - database System Architecture,

Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design : Top-Down Design Process

Distribution Design Issues :Reasons for Fragmentation, Fragmentation Alternatives, Degree of Fragmentation, Correctness Rules of Fragmentation, Allocation alternatives, Information Requirements, Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation

Unit – II : Query processing and Optimization :

Query processing and decomposition: Query Processing Problem , Objectives of Query Processing , Complexity of Relational Algebra Operations , Characterization of Query Processors . Query processing objectives, characterization of query, processors, layers of query processing,

Query Decomposition and Data Localization :query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query, Join Ordering in Distributed Queries, optimization algorithms.

Unit – III :Transaction Management :

Definition, properties of transaction, types of transactions

Distributed Concurrency Control: serializability, Taxonomy of Concurrency Control Mechanisms, **Locking-Based Concurrency**

Control Algorithms : Centralized 2PL, Distributed 2PL

Timestamp-Based Concurrency Control Algorithms: Basic TO Algorithm, Conservative TO Algorithm, Multiversion TO Algorithm, concurrency control mechanisms & algorithms, time - stamped &optimistic concurrency control Algorithms

Deadlock Management: Deadlock Prevention , Deadlock Avoidance, Deadlock Detection and Resolution .

Unit – IV : Distributed DBMS Reliability :

Distributed DBMS Reliability : Reliability concepts and measures:- System, State, and Failure , Reliability and Availability, Mean Time between Failures/Mean Time to Repair, fault-tolerance in distributed systems,

failures in Distributed DBMS : Transaction Failures, Site (System) Failures , Media Failures, Communication Failures

local & distributed reliability protocols : Architectural Considerations , Recovery Information , Execution of LRM Commands, Checkpointing. Handling Media Failures, site failures and network partitioning.

Parallel Database Systems : Parallel database system architectures:- Objectives, Functional Architecture, Parallel DBMS Architectures , parallel data placement, **parallel query processing :** Query Parallelism, Parallel Algorithms for Data Processing, Parallel Query Optimization . load balancing:- Parallel Execution Problems, Intra-Operator Load Balancing, Inter-Operator Load Balancing, Intra-Query Load Balancing

database clusters : Database Cluster Architecture, Replication, Load Balancing, Query Processing , Fault- tolerance

Unit – V: Object DBMS Model :

Distributed object Database Management Systems: Fundamental object concepts and models:- Object , Types and Classes, Composition (Aggregation), Subclassing and Inheritance .

Object distributed design: Horizontal Class Partitioning, Vertical Class Partitioning, **Architectural issues :** object management, Pointer Swizzling, Object Migration, distributed object storage Path Partitioning, Class Partitioning Algorithms, Allocation

Object query Processing : Object Query Processor Architectures , Query Processing Issues , Query Exec

Object Oriented Data Model : Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS.

Suggested Readings :
1. M. Tamer OZSU and PatuckValduriez, " Principles of Distributed Database Systems", Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatt, "Distributed Databases", McGraw Hill.

Reference Books :
1. Hector Garcia - Molina, Jeffrey D. Ullman, Jennifer Wisdom, "Database Systems: The Complete Book", Pearson International Edition, Second Edition

VI Semester Syllabus
IT615PE: Software Testing Methodologies
(Professional Elective – II)

L	T	P	C
3	0	0	3

Course Objectives :

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test and management using. To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
- It also helps to learn the types of bugs, testing levels with which the student can very well identify a bugand correct as when it happens.
- It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.
- To learn the domain testing, path testing and logic based testing to explore the testing process easier.

Course Outcomes:

- Know the basic concepts of software testing and its essentials.
- Able to identify the various bugs and correcting them after knowing the consequences of the bug.
- Use of program's control flow as a structural model is the corner stone of testing.
- Performing functional testing using control flow and transaction flow graphs.
- Plan and Design and develop the best test strategies in accordance to the development model.

Unit – I: Introduction:

Purpose of testing-Goals of testing, Phases in a Tester's Mental life, Test design, Testing is everything, The Pesticide Paradox and the complexity Barrier, Dichotomies-Testing Versus Debugging, Function versus Structure, model for testing Overview, The Environment, The Progress, Bugs, Tests, Testing Levels, consequences of bugs, Importance of Bugs, The Nightmare List and When to stop Testing, Taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

Unit – II: Transaction Flow Data Flow, Domain Testing's :

Transaction Flow Testing: transaction flows-Definitions, Example, Usage, Implementation, Perspective, Complications, Transaction Flow Structure, Transaction flow testing techniques-Inspections, Reviews, Walkthroughs, Path Selection, Sensitization, Instrumentation, Test Databases .

Dataflow testing: Basics of dataflow testing-Motivations and Assumptions, Data Flow graphs, The Data Flow Model, Strategies in dataflow testing-Terminology, The Strategies, Slicing, Dicing, Data Flow, and Debugging, Application of dataflow testing.

Domain Testing: Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

Unit – III: Paths, Path products and Regular expressions:

Motivation, path products & path expression, Overview, Basic Concepts, Path Products, Path Sums, Distributive Laws, Absorption Laws, Loops, Identity Elements, A reduction procedure – Overview , Cross- Term Step, Parallel Term, Loop Term, Applications- How many Paths in a Flow Graphs, Approximate Minimum Number of Paths, The Probability of Getting There, The Mean Processing Time of a Routine, Push/Pop, Get/Return, Limitations and Solutions, regular expressions & flow anomaly detection.

Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

Unit – IV: State, State Graphs and Transition testing:

Motivational Overview, State graphs, States, Inputs and Transitions, Outputs, State Tables, Time Versus Sequence, Software Implementation. Good & bad state graphs-General State Bugs, Transition Bugs, Output Errors, Encoding Bugs, State Testing-Impact of Bugs, Principles, Limitations and Extensions, What to Model, Getting the Data, Tools, Testability tips-A Balm for Programmers, How Big, How small, Switches, Flags, and Unachievable Paths, Essential and Inessential Finite-State Behaviour, Design Guidelines.

Unit – V: Graph Matrices and Application:

Motivational Overview, The Problem with Pictorial Graphs, Tool Building, Doing and Understanding Testing Theory, The Basic Algorithms, Matrix of graph-Basic Principles, A simple Weight, Relations-Properties of Relations, Equivalence Relations, Partial Ordering Relations, Power of a Matrix-Principles, Matrix Power and Products, The set of all Paths, Loops, Partition Algorithms, Breaking Loops and Applications. Node reduction algorithm - Some Matrix Properties, The Algorithm, Applications, Building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

Suggested Readings :

1. Baris Beizer , "Software Testing techniques", Dreamtech, second edition.
2. Dr. K. V. K. K. Prasad, "Software Testing Tools", Dreamtech.

Reference Books:

1. Brian Marick , "The craft of software testing", Pearson Education.
2. SPD, "Software Testing Techniques", Oreille
3. Edward Kit, "Software Testing in the Real World", Pearson.
4. Perry, "Effective methods of Software Testing", JohnWiley.
5. Meyers, "Art of Software Testing", John Wiley.

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VI Semester Syllabus
IT616PE: Python Programming
(Professional Elective – II)

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L	T	P	C
3	0	0	3

Course Objectives:

This course will enable students to
- Learn Syntax and Semantics and create Functions in Python.
- Handle Strings and Files in Python.
- Understand Lists, Dictionaries and Regular expressions in Python.
- Implement Object Oriented Programming concepts in Python.
- Build Web Services and introduction to Network and Database Programming in Python

Course Outcomes:

The students should be able to:
- Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Unit – I : Python Basics :

Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types **Numbers** - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

Unit – II : Files :

File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions,

*Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built- in Functions, Packages, Other Features of Modules

Unit – III : Regular Expressions :

Introduction, Special Symbols and Characters, Res and Python

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

Unit – IV : GUI Programming:

Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

Unit – V : Database Programming:

Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules

Suggested Readings :

1. Wesley J. Chun, "Core Python Programming", Pearson, Second Edition

Reference Books:

1. Martin.C.Brown, "Python: The Complete Reference", McGraw-Hill, First Edition

VI Semester Syllabus

CS616PE: IT Operations –I (Professional Elective-II)
(Common to CSE, IT & ECE)

L	T	P	C
3	0	0	3

Prerequisites: Understanding of Networks and Machine Learning

CourseObjectives:

- ▪ To gain understanding on IT Industry Services
- ▪ To gain ability to recognize situations in production management to quantitative methods in Operations Management decision making.

CourseOutcomes:

- Define IT industry services, activities and Infrastructure
- Interpret the various roles of IT operations, Corporate Etiquette.
- Illustrate service management of IT and ITIL Basics
- Understand the basics of AIML & AIOPS

Unit – I :

Evolution of Technologies & IT-ITES Industry- Overview of the IT Industry, services & activities, IT Production Support and Projects, Skills of Production support engineer
Transmission Media- Telephone lines, Cable Television Lines, satellites antennas, routers, Infrastructure - Data Centers, computers, Computer Networks, Database Management Devices, and a Regulatory system, Support the delivery of business systems and IT-enabled processes.

Introduction to Application Management Services- Services of enterprise application management, increase efficiency, service-oriented culture, cycle time of processes, ensuring uninterrupted IT and business continuity through resilient, reliable and predictable operations.

Unit – II :

Introduction to IT Operations & Incident Analysis- Infrastructure & configurations, Governance and Disaster Recovery. Roles of IT Operations. IT Operations: IT Monitoring, Ticketing Systems & its life cycle, Shift Operations, Incident Management, Problem Management, Change Management, Escalations.

Unit – III :

ITIL Basics: Introduction to IT Service Management: Value, Value co-Creation, Service Providers, Service Consumers, Stakeholders, Products, Services, Configuring resources for value creation, service Offerings, Service relationship, Utility & Warranty, Service Management, ITIL guiding Principles.

Unit – IV :

Introduction to Cloud & Support- Definition, History, Market size, growth roadmap, Cloud Types, Cloud Service Models, Key Players, Key Offerings of Cloud MSPs. Introduction to AWS, AWS Global Infrastructure, Databases types, Sage Maker, DR/BCP Options.

Introduction to AI/ML & AIOPS- History of AI, Structured & Unstructured Data, AI Terminologies, Supervised & Unsupervised Learning, Basic algorithms, Differences between AI/Machine Learning/Deep Learning, Implications of Artificial Intelligence, and Introduction to Augmented Intelligence led IT Operations includes AIOps platform combines big data and machine learning functionality.

Unit – V :

Information Security: Introduction to Information Security, Password Management, Email Usage, Internet Usage, Software Compliance & Data Storage. System Threats, Security Violations.

Common Tools: Overview and Introduction of Microsoft 365 entire suite of tools/Applications, Troubleshooting PC problems in Real life Problems.

Corporate Etiquette & Communication: Active Listening Skills, Effective Executive Speaking Skills Verbal Spoken Communication, Telephone Etiquette, Email Etiquette, Meeting Excellence.

Suggested Readings / ReferenceBooks:

1. Intelligent Automation by Pascal Bornet, Ian Barkin& Jochen Wirtz
2. IT Operations Management, ServiceNow EBook

VI Semester Syllabus

CS617PE: Devops (Professional Elective-II)
(Common to CSE, IT & ECE)

L	T	P	C
3	0	0	3

Course Objectives:

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

Course Outcomes:

- Identify components of Devops environment.
- Describe Software development models and architectures of DevOps.
- Apply different project management, integration, testing and code deployment tool.
- Investigate different DevOps Software development models.
- Assess various Devops practices.
- Collaborate and adopt Devops in real-time projects.

Unit–I :

Introduction: Introduction, Agile development model, DevOps and ITIL. DevOps process And Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

Unit – II :

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps and Continuous Testing.

DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices and the data tier, DevOps, architecture and resilience.

Unit–III :

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

Unit–IV :

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

Unit–V :

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, SaltStack and Docker

Suggested Readings:

1. JoakimVerona.PracticalDevops,SecondEdition.Ingramshorttitle;2ndedition(2018). ISBN-10:1788392574
2. DeepakGaikwad,ViralThakkar.DevOpsToolsfromPractitioner'sViewpoint.Wiley publications.ISBN:9788126579952

Reference Books:

1. LenBass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley;ISBN-10.

VI Semester Syllabus
IT651PC: Embedded Systems & Internet Of Things Lab

L	T	P	C
0	0	3	1.5

Course Objectives:

- To make students familiar with the basic concepts and terminology of the target area, the embedded systems design flow.
- To expose students to the IDE Tool by solving Arithmetic, Logical and I/O related programs.
- To introduce the I/O interfacing using 8051 microcontroller.
- To acquaint students with methods of executive device control and to give them opportunity to apply and test those methods in practice.
- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of different sensor on IoT devices

Course Outcomes:

After completion of the course, students will be able to

- Understand and apply the fundamentals of microcontroller using programming concepts.
- Design and program an embedded system at the basic level.
- Work with standard microcontroller 8051 real time interfacing including GPIO, serial ports.
- Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor.
- Get the skill to program using python scripting language which is used in many IoT devices

List of Experiments:

Embedded Systems Lab :

1. Introduction to Keil C51 IDE Tool.
2. Programming using arithmetic, logical and bit manipulation instructions of 8051.
3. Block Data transfer between internal memory, internal& external memory.
4. Time delay Generation Using Timers of 8051.
5. Serial Communication using 8051.
6. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ.
7. Interfacing I/O Device 7 Segment Display to 8051.

Internet of Things Lab:

1. **Functional Testing Of Devices :**
   Flashing the OS on to the device into a stable functional state by porting desktop environment with necessary packages.

2. **ON/OFF Control Based On Light Intensity**
   Using the light sensors, monitor the surrounding light intensity & automatically turn ON/OFF the high intensity LED's by taking some pre-defined threshold light intensity value.

3. **Battery Voltage Range Indicator**
   Monitor the voltage level of the battery and indicating the same using multiple LED's (for ex: for 3V battery and 3 led's, turn on 3 led's for 2-3V, 2 led's for 1-2V, 1 led for 0.1-1V & turn off all for 0V)

4. **Dice Game Simulation**
   Instead of using the conventional dice, generate a random value similar to dice value and display the same using a 16X2 LCD. A possible extension could be to provide the user with option of selecting single or double dice game.

5. **Using Arduino**
   a. Calculate the distance using distance sensor.
   b. Implement Smoke Detection
   c. Calculate temperature using temperature sensor.

6. **Using Node MCU**
   a. Calculate the distance using distance sensor.
   b. Implement Smoke Detection.
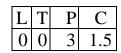   c. Calculate temperature using temperature sensor.

7. **Using raspberry pi**
   a. Calculate the distance using distance sensor.
   b. Implement Smoke Detection
   c. Calculate temperature using temperature sensor.

Suggested Readings :

1. The 8051 Microcontrollers: Architecture, Programming & Applications by Dr. K. Uma Rao, Andhe Pallavi, Pearson, 2009.

2. Kothari D.P., Shiram K.V., Sundaram. "Embedded Systems. New age international", 2012

3. BahgaArshdeep, Madisetti Vijay, "Internet of Things - A Hands-on Approach", Universities Press, 2015, ISBN: 9788173719547

4. Matt Richardson, Shawn Wallace "Getting Started with Raspberry Pi", O'Reilly (SPD), 2014, ISBN: 978935023975

VI Semester Syllabus
IT652PC: Compiler Design Lab

L	T	P	C
0	0	3	1.5

Course Objectives:

- To understand the various phases in the design of a compiler.
- To understand the design of top-down and bottom-up parsers.
- To understand syntax directed translation schemes.
- To introduce lex and yacc tools.

Course Outcomes:

- Ability to design, develop, and implement a compiler or any language.
- Able to use lex and yacc tools for developing a scanner and a parser.
- Able to design and implement LL and LR parsers.

List of Experiments:

1. Write a LEX Program to scan reserved word, Identifiers, Keywords & Operators of C Language.
2. Implement Brute Force Method.
3. Implement Recursive Descent Algorithm.
4. Implement Predictive Parsing Algorithm.
5. Implement Shift Reduce Parsing.
6. Write a C program to generate Quadruples representation of three address code.
7. Implement YACC for a Grammar.
8. YACC Program to evaluate an expression (Simple calculator)
9. YACC Program to recognize string with grammar { $a^n b^n \mid n >= 0$ }
10. Design LALR bottom-up parser for the given language

    <program> ::=<bIock>

    <bIock> ::= { <variabIedefinition><sIist> } I (*sIist>)

    <variabIedefinition> ::= int <vardefIist> ;

    <vardefIist> ::=<vardec> I <vardec> , <vardefIist>

    <vardec> ::=<identifier> I‹ identifier> [<constant>]

    <slist> ::=<statemen›t I <statement> ; <slist>

    <statement> ::=<assignment>

    ‹Iifstatemen›t I

    <whiIestatement>

    I <bIock> I‹ printstatement> I <empty>

    <assignment> ::=<identifier> =

    <expression>I ‹ identifier> [

    <expression>] = <expression>

    <ifstatement> ::= if <bexpression> then <sIist> else <sIist> endif I

    if <bexpression> then <sIist> endif

    <whiIestatement> ::= while <bexpression> do <sIist>enddo

    <printstatement> ::= print (<expression>)

    <expression> ::= <expression><addingop><term›   I <term›   I

<addingop><term>

<bexpression> ::=<expression><reIop><expression>

<reIop> : °‹ I ‹° I °° I ›° ›I

I !=

<addingop> : - + I -

<term> ::=<term><muItop><factor> I <factor>

<muItop> : ° * I

<factor> ::=<constan›It‹ideInti(fier> ‹I identifier> [<expression>]

<expression>)

<constant> ::=<digi‹› I <digit><constant>

<identifier> ::=<identifier><Ietterordig‹i› I <Ietter>

<Ietterordigit> ::= <Iette›r I <digit>

<Ietter> ::= alblcldIeI*IsIhI IjIkI!Imlnl lplqlrlsItIuIvIwIxIyI•

<digit> ::= 01 1I2I3I4I5I6I7I8I9

<empty> has the obvious meaning

Comments (zero or more characters enclosed between the standard C/Java-style comment brackets *I*...*I)* can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Note also that you should worry about the scoping of names.

A simple program written in this language is:

```
  {
   int a[3],t1,t2;
    t1=2;
   a[0]=1;
   a[1]=2;
    a[t1]=3;
   t2=-(a[2]+t1*6)/(a[2]-t1);
   if t2>5 then print(t2);
   else
   {
    int   t3;
    t3=99;
    t2=-25;
   print(-t1+t2*t3); /* this is a  comment on 2 lines */
   }
   endif
```

VI Semester Syllabus

IT615PE:Software Testing Methodologies Lab
(Professional Elective – II Lab)

L	T	P	C
0	0	2	1

Course Objectives:

- To provide knowledge of Software Testing Methods.
- To develop skills in software test automation and management using latest tools

Course Outcomes:

● Design and develop the best test strategies in accordance to the development model.

List of Experiments:

1. Recording in context sensitive mode and analog mode
2. GUI checkpoint for single property
3. GUI checkpoint for single object/window
4. GUI checkpoint for multiple objects
5. a) Bitmap checkpoint for object/window
   b) Bitmap checkpoint for screen area
6. Database checkpoint for Default check
7. Database check point for custom check
8. Database checkpoint for runtime record check
9. a) Data driven test for dynamic test data submission
   b) Data driven test through flat files
   c) Data driven test through front grids
   d) Data driven test through excel test
10. a) Batch testing without parameter passing b) Batch testing with parameter passing
11. Data driven batch
12. Silent mode test execution without any interruption
13. Test case for calculator in windows application

Suggested Readings :

1. E.Horowitz, S.Sahniand Susan Anderson Freed, "Fundamentals of Data structures in C", 2ndEdition, Universities Press

Reference Books:

1. B.W. Kernighan, Dennis M.Ritchie, "The C Programming Language", PHI/ Pearson Edn.

VI Semester Syllabus
IT616PE: Python Programming Lab
(Professional Elective – II Lab)

L	T	P	C
0	0	2	1

CourseObjectives:

- To be able to introduce core programming basics and program design with functions using   Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

CourseOutcomes:

- Student should be able to understand the basic concepts scripting and the contributions of scripting language
- Ability to explore python especially the object oriented concepts, and the built in objects of Python.
- Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations

List of Experiments :

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST2017"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries inpython.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: c/5 =f-32/9]
10. Write a Python program to construct the following pattern, using a nested forloop

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow(x,n)
20. Write a Python class to reverse a string word by word.

VI Semester Syllabus
CS616PE: IT Operations -I LAB
(Professional Elective – II Lab)
(Common to CSE, IT & ECE)

L	T	P	C
0	0	2	1

Course Objectives:

- Will be able to learn the applications of Microsoft 365

Course Outcomes:

- Apply the features of Microsoft 365 and Application Development

List of Experiments:

1. Overview of Microsoft 365
   a. Overview of Microsoft 365 for Education

2. Microsoft Office Online
   a. Microsoft Office Online
   b. Word
   c. PowerPoint
   d. Excel
   e. One Drive

3. Microsoft Teams for Education
   a. What is Microsoft Teams for Education?
   b. Store and Share Files
   c. Create Assignments
   d. Create a Quiz

4. Microsoft OneNote for Education
   a. Microsoft OneNote for Educators
   b. One Note Class Notebooks
   c. OneNote Web Clipper

5. Other Microsoft Apps and Services
   a. Forms
   b. Sway
   c. Stream

Reference Books:

https://www.linkedin.com/learning/office-365-for-educators/share-a-course-syllabus-with-your-students

VI Semester Syllabus
CS617PE: Devops Lab
(Professional Elective – II Lab)
(Common to CSE, IT & ECE)

L	T	P	C
0	0	2	1

Course Objectives:

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability
- Implement automated system update and DevOps lifecycle

Course Outcomes:

- Identify components of Devops environment
- Apply different project management, integration, testing and code deployment tool
- Investigate different DevOps Software development, models
- Demonstrate continuous integration and development using Jenkins.

List of Experiments :

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written inexercise1.
4. Jenkins installation and setup,explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 Using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in Java Script and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

Suggested Readings :

1. Joakim Verona.Practical Devops, Second Edition.Ingram short title; 2nd edition (2018). ISBN-10:1788392574
2. Deepak Gaikwad,Viral Thakkar. DevOps Tools from Practitioner's View point. Wiley publications.ISBN:9788126579952

ReferenceBooks/LearningResources:

1. LenBass, IngoWeber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley
2. Edureka DevOps Full Course-https://youtu.be/S_0q75eD8Yc

VI Semester Syllabus
MC502ES /MC602ES: Cyber Security
(Common to all Branches)

L	T	P	C
3	0	0	0

Prerequisites : NIL

Course Objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyberlaws
- To study the defensive techniques against these attacks

Course Outcomes:

The students will be able
- To understand various cyber-attacks and cybercrimes.
- Knowledge about cyberlawsand cyber forensics.
- Summarize cyber crimes in mobile and wireless devices, how to protect them
- Knowledge about IPR issues in cyber space and cyber terrorism.

Unit–I :

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIATriad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, IP spoofing, Security Models, risk management,

Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Comprehensive Cyber Security Policy.

Unit–II :

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Unit–III :

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations.

Unit –IV :

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, webthreats for organizations, security and privacy implications, social media marketing.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the Ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Unit–V :

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Datalinking and profiling, privacy policies and their specifications, privacy policy languages, privacy indifferentdomains-medical,financial,etc.

Suggested Readings :

1. NinaGod bole and Sunit Belpure, Cyber Security Understanding CyberCrimes, Computer Forensics and Legal Perspectives,Wiley, India 2012.

2. B.B.Gupta,D.P.Agrawal,Haoxiang Wang, Computer and CyberSecurity : Principles, Algorithm, Applications and Perspectives, CRC Press, ISBN: 9780815371335,2018.

Reference Books:

1. Mark F. Grady, FransescoParisi, " The Law and Economics of Cyber security", Cambridge University Press,2006.

2. Cyber Security Essentials, James Graham, Richard Howard and RyanOtson, CRC Press, 2016.

3. Introduction to Cyber Security, Chwan - Hwa (john) Wu, J. David Irwin, CRC Press T & F Group.

VI Semester Syllabus
IT621OE : Human Computer Interaction
(Open Elective – II)

L	T	P	C
2	0	0	2

Course Objectives:

- To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface. Be able to apply models from cognitive psychology to predicting user performance in various human- computer interaction tasks and recognize the limits of human performance as they apply to computer operation.
- Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user.
- Be familiar with a variety of both conventional and non-traditional user interface paradigms, virtual and augmented reality, mobile and wearable computing, and ubiquitous computing.
- Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems.
- Working in small groups on a product design from start to finish will provide you with invaluable team- work experience.

Course Outcomes:

- Understand the importance of Graphical user interface and human characteristics in design and how people interact with computers.
- Students can articulate and apply common design principles for making good decisions in the design of user interfaces.
- Understand various kinds of components that are available in the screens and windows and their characteristics and have an ability to select the proper device based and screen based controls. Design effective HCI for individuals and persons with disabilities
- Ability to design multimedia/ ecommerce/ e-learning Web sites

Unit – I : Importance of user Interface :

Defining the User Interface, importance of good design: Benefits of good design, The Blossoming of the World Wide Web: A brief history of Screen design.

Characteristics of Graphical and Web User Interfaces: Introduction of the graphical user interface, The Graphical User Interface: popularity of graphics, the concept of direct manipulation

Graphical Systems: Advantages and Disadvantages, Characteristics of the Graphical User Interface,

The Web user Interface: The Popularity of the Web, Characteristics of a Web Interface.

Unit – II : The User Interface Design Process :

Know Your User or Client: Human interaction with computers, importance of human characteristics in Design, Human Considerations in the Design of Business Systems, Human interaction speeds.

Understand the Business Function: Determining Basic Business Functions

Understand the Principles of Good Interface and Screen Design: Human

Considerations in Interface and Screen Design: Screen and Web Page Meaning and Purpose, Organizing Elements Clearly and Meaningfully, Ordering of Data and Content, Navigation and Flow, Visually Pleasing Composition , Focus and Emphasis, Presenting Information Simply and Meaningfully

The Web — Web sites and Web Pages: Browsing and Searching, Statistical Graphics, Technological Considerations in Interface Design.

Unit – III : The User Interface Design Process :

Develop System Menus and Navigation Schemes: Web Site Navigation, Kinds of Graphical Menus

Select the Proper Kinds of Windows: Window Characteristics, Components of a Window, Window Presentation Styles, Types of Windows, Organizing Window Functions, The Web and the Browser, Select the Proper Interaction Devices, Choose the Proper Screen-Based Controls

Write Clear Text and Messages: Words, Sentences, Messages, and Text, Content and Text for Web Pages.

Create Meaningful Graphics, Icons, and Images: Icons, Multimedia

Graphics Choose the Proper Colors: Color Uses, Possible Problems with Color, Choosing Colors for Textual Graphic Screens, Choosing Colors for Statistical Graphics Screens, Choosing Colors for Web Pages

Unit – IV : HCI in the software process :

The software life cycle, Usability engineering, Iterative design and prototyping-
Design Focus: Prototyping in practice, Design rationale,

Design rules: Principles to support usability, Standards, Golden rules and heuristics,

HCI patterns. Evaluation techniques: Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method.

Universal design: Universal design principles, Multi-modal interaction- Design Focus: Designing websites for screen readers, Design Focus: Choosing the right kind of speech

Design Focus: Apple Newton

Unit – V : Cognitive models :

Goal and task hierarchies, Design Focus: GOMS saves money, Linguistic models, The challenge of display- based systems, Physical and device models, Cognitive architectures.

Ubiquitous computing and augmented realities: Ubiquitous computing applications research.

Design Focus: Ambient Wood – augmenting the physical, Design Focus: Shared experience, Virtual and augmented reality, Applications of augmented reality, Information and data visualization, Getting the size right.

Suggested Readings:

1. Wilbert O Galitz, "The essential guide to user interface design", Wiley Dream Tech. Units 1, 2, 3
2. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, "Human – Computer Interaction", Pearson Education Units 4,5

Reference Books:

1. Ben Shneidermann, "Designing the user interface", Pearson Education Asia, 3rdEdition
2. Rogers, Sharps. "Interaction Design Prece", Wiley Dreamtech.
3. Soren Lauesen , "User Interface Design", Pearson Education.
4. D. R. Olsen, "Human –Computer Interaction", Cengage Learning.
5.   Smith - Atakan, "Human –Computer Interaction", Cengage Learning

VI Semester Syllabus
CS621OE: Computer Networks (Open Elective-II)
(Except CSE,IT, CSBS,CS(AI&ML),CS(Data Science))

L	T	P	C
2	0	0	2

Course Objectives:

- Familiarize the knowledge of the functions of each layer in the OSI and TCP/IP referencemodel.
- Identify the Error detection and correction techniques in Data Link Layer.
- Analyze the knowledge of routing algorithms.
- Understand the connection management of TCP&UDP Protocols.
- Ability to understand the concepts of DNS & Electronic Mail.

Course Outcomes:

- Gain the knowledge of the functions of each layer in the OSI and TCP/IP referencemodel.
- Gain the knowledge of Error detection and correction techniques.
- Gain the knowledge of routing algorithms.
- Gain the knowledge of TCP&UDP connection management.
- Gain the knowledge of DNS & Electronic Mail.

Unit –I :

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

Unit – II :

Data link layer: Design issues, framing, Error detection and correction.

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem,

Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

Unit– III :

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

Unit–IV:

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

Unit–V :

Application Layer –Domain Name System, SNMP,

Electronic Mail; the World WEB, HTTP, Streaming audio and video.

Suggested Readings :

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5thEdition.Pearson Education / PHI

2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education

2. "Data and Computer Communications" by William Stallings 9th Edition, Pearson Education 2010.

3. "TCP/IP Illustrated" by W. Richard Stevens,Addison-Wesley Professional; 2nd edition 2011.

VI Semester Syllabus
CS623OE: Java Programming(Open Elective-II)
(Except CSE,IT, CSBS,CS(AI&ML),CS(Data Science)

L	T	P	C
2	0	0	2

Course Objectives:

- To understand object-oriented programming concepts using Java.
- To implement the concepts of packages and interfaces
- To introduce the concepts of exception handling and multithreading
- To describe various data manipulation operations using collection framework
- To develop Graphical User Interface applications using applets and swing controls

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to implement the concepts of packages and interfaces
- Able to develop multithreaded applications with synchronization
- Able to solve problems using java collection framework
- Able to design GUI based applications

Unit – I :

Object-Oriented Thinking- Introduction to Object-Oriented concepts, Java buzzwords,

An Overview of Java, Data types, Variables and Arrays, operators, expressions,

control statements, Introducing classes: Class fundamentals, Declaring objects,

introducing Methods, Constructors, and this keyword, method overloading, String handling.

Inheritance– Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract class, using final with inheritance and Object class.

Unit – II :

Packages- Defining a Package, CLASSPATH, Access protection, importing packages.

Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces, extending interfaces, default interface methods, use static methods in an interface

Exception handling - Fundamentals of exception handling, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Unit – III :

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files,generics.

Unit – IV :

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set. Collection algorithms, Arrays, The Legacy Classes,

More Utility classes, String Tokenizer,Random, Scanner.

Unit – V :

GUI Programming with Swing – Introduction to AWT, components, containers.

Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events.**A Simple Swing Application**, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets, Creating a Swing Applet, Painting in Swing, A Paint example.

Suggested Readings :

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd 2014.

2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education 2000.

Reference Books:

1. Y. Daniel Liang, Introduction to Java programming, Pearson Education 2013.

2. P. Radha Krishna Object Oriented Programming through Java, University Press 2007.

3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press 2013.

VI Semester Syllabus
MA654BS:Finishing School-IV
(Quantitative Aptitude & Analytical Ability)
(Common to CSE, IT, CSB, CSM & CSD)

L	T	P	C
0	0	2	1

Course Objectives :

This is a foundation course and aims to enhance employability skills in students.

- Students will be introduced to higher order thinking skills and problem-solving on the following areas - Arithmetic ability, Numerical ability and General reasoning.
- Students will be trained to work systematically with speed and accuracy while solving problems.

Course Outcomes:

At the end of the course students will be able to:

- Solve questions on the above-mentioned areas using shortcut and smart methods
- Understand the fundamental concepts of Aptitude skills
- Perform calculations with speed and accuracy

Unit – I :QUANTITATIVE APTITUDE - NUMERICAL ABILITY

- Number system
- Divisibility Rules
- Square root
- Cube root
- Problems on numbers
- LCM and HCF

Unit – II: QUANTITATIVE APTITUDE- ARITHMETIC ABILITY-I

- Percentage
- Ratio proportions
- Averages
- Profit, loss and discounts
- Simple and Compound interest

Unit – III : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY-II

- Pipes and Cisterns
- Ages
- Time- Work-Speed-Distance
- Clocks & Calendars
- Venn diagrams
- Tables and graphs

Unit –IV : REASONING ABILITY – GENERAL REASONING-I

- Coding decoding
- Directions
- Series completions - Letter, Number & Element Series
- Seating arrangements
- Symbols and Notations

Unit – V : REASONING ABILITY- GENERAL REASONING -II

- Analogies
  - Alphabet Analogy
  - Numerical Analogy
- Classification
  - Alphabet Classification
  - Word Classification
  - Miscellaneous Classification
- Alphabet test
  - Arranging words in Alphabetical Order
  - Problems based on Letter-Word
  - Problems based on Alphabetical Quibble
- Blood Relations

Reference Books :

1. R.S. Aggarwal - Quantitative Aptitude for Competitive Examinations.
2. Arun Sharma - Quantitative Aptitude for CAT.
3. Arihant Publications - Fast Track Objective Arithmetic.
4. Sarvesh K.-Quantitative aptitude
5. A New Approach to Reasoning Verbal & Non-Verbal, Book by B.S. Sijwalii and InduSijwali
6. A Modern Approach to Logical Reasoning, Book by Agarwala Vikas and R.S. Aggarwal

VI Semester Syllabus
MC601ESC: Environmental Science
(Common to CSE, IT, CSBS, CSE (AI&ML) & CSE (DS)])

L	T	P	C
3	0	0	0

Course Objectives:

- To understand the natural resources and their conservation.
- To understand the importance of ecosystem, biodiversity and ecological balance for sustainable development.
- To gain knowledge about environmental pollution, effects and controlling measures.
- To study about global environmental problems and global issues.
- To understand the environmental policies, regulations and sustainable development

Course Outcomes:

After completing the course, the student will be able to:

- Learn about different types of natural resources and take up the measures to protect the resources.
- Get the information about ecosystem, biodiversity and their usage and conservation.
- Get the information about the types of pollution, understand their effects and controlling measures.
- Gain the knowledge about current global environmental issues and initiations to be taken to protect the environment.
- • Gain the knowledge about environmental acts, EIA, sustainable development and follow the rules and regulations.

Unit – I :Natural Resources

Classification - Renewable and Non-renewable resources.

Forest Resources - Uses, deforestation- causes, effects and preventive measures.

Water Resources - Uses and over utilization of ground water, rain water harvesting, dams - benefits and problems. Causes, effects and management of floods and drought.

Mineral Resources - Uses and Impacts of mining.

Energy Resources - Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources.

Unit – II :Ecosystem and Biodiversity

Ecosystem: Concept of ecosystem - Structure and functions of ecosystem. Food chain, food web and ecological pyramids - significance. Primary and secondary production - Energy flow models: universal and single channel. Biogeochemical Cycles: Carbon cycle and Nitrogen cycle.

Biodiversity: Definition, Levels of biodiversity, Values of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity: In-Situ and Ex-Situ conservation methods.

Unit – III : Environmental Pollution

Pollution - Definition and classification.

Air pollution: Definition, sources, causes, effects and control measures. Ambient air quality parameters, Case Study.

Water pollution: Definition, sources, causes, effects and control measures. Waste water treatment. Case study (Namami Ganga Project) Soil pollution: Sources, Land degradation - Soil erosion – effects and control measures. Impacts of modern agriculture on soil. Biomagnification and Bioaccumulation (Minamata disease).

Noise pollution: Sources, effects and control measures.

Solid Waste: E-Waste and Municipal solid waste management.

Unit – IV: Global Environmental Issues and Global Efforts

Global warming: Greenhouse effect - definition, sources and effects of greenhouse gases. Ozone layer depletion -Importance of ozone layer, Ozone depleting substances - sources and effects. Acid rain - causes and effects. Climate change - National Action Plan on Climate Change (NAPCC) – Government of India Initiatives. International conventions/protocols: The Earth summit, Kyoto Protocol and Montreal Protocol. Carbon credits - Emission trading, Green Chemistry Principles. Biodiesel-concept - transesterification and advantages.

Unit – V : Environmental Acts, EIA & Sustainable Development

Environmental Protection Act - Legal aspects: Air (Prevention and control of pollution) Act 1981, Water (Prevention and control of pollution) Act -1974, Wildlife (Protection) Act – 1972, Biodiversity Act - 2002. Environmental Impact Assessment (EIA) - Concept, structure and flow chart of EIA. Concept of sustainable development - Environmental education, Concept of green building, Ecological foot print, Low carbon life style, Life cycle assessment (LCA) and Clean development mechanism.

Project Work : Related to current environmental issues.

Suggested Readings :

1. ErachBharucha, Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission, Universities Press, 3rd Edition.
2. Kaushik A., Kaushik C.P., Text Book of Environmental Studies, New Age International Publishers, 4th Edition.

Reference Books:

1. Anji Reddy M, Textbook of Environmental Sciences and Technology, BS Publication.
2. Rajagopalan R., Environmental Studies, Oxford University Press, 3rd Edition.
3. Raghavan Nambiar K., Text Book of Environmental Studies, Scitech Publications, 2nd Edition.

Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instruction and Examination
(Choice Based Credit System)
VII Semester

S. No	Course Code	Course Title	Instruction			Examination		Duration of SEE in Hours	Credits
			Hours Per Week			Max. Marks			
			L	T	P/D	CIE	SEE		
1.	MS705HS	Organizational Behaviour	3	0	0	30	70	3	3
2.	IT701PC	Information Security	3	0	0	30	70	3	3
3.		Professional Elective – III	3	0	0	30	70	3	3
4.		Professional Elective – IV	3	0	0	30	70	3	3
5.		Open Elective – III	2	0	0	30	70	3	2
6.	IT751PC	Information Security Lab	0	0	2	30	70	3	1
7.		Professional Elective – III Lab	0	0	2	30	70	3	1
8.	IT752PC	Industry Oriented Mini Project / Summer Internship	0	0	4	-	100	-	2*
9.	IT753PC	Seminar	0	0	2	100	-	-	1
10.	IT754PC	Project Stage – I	0	0	4	30	70	-	2
Total Hours / Marks / Credits			**14**	**0**	**14**	**340**	**660**		**21**

* Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation
   between 6th and 7th semesters. Students should submit a report of Industrial Oriented Mini Project /
   Summer Internship for evaluation.

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VII Semester Syllabus

MS705HS: Organizational Behaviour

(Common to CSE & IT)

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L	T	P	C
3	0	0	3

Course Objective: The objectives of the course are:

- To understand the perception and attribution concepts in organizational and external environmental context.
- To discuss the concepts and theories of personality, attitudes and Motivation
- To understand the decision making and communication process in interpersonal and their intrapersonal context.
- To familiarize the students with the basic understanding of individual behavior and explore issues of power and empowerment.
- To discuss the concepts of High performance, Learning and Leadership.

Course Outcomes : Upon the completion of the subject, the student will be able to

- Analyze the concepts of perception and attribution of individuals and groups in organizations
- in terms of the key factors that influence organizational behavior
- Acquire knowledge of personality and attitudes of individuals in applying motivational theories to resolve problems of employees.
- Apply group dynamics and skills required for working in groups and identify the processes used in developing communication and decision making to overcome stress and conflicts.
- Analyze organizational behavioral issues in the context of, power, and empowerment issues.
- Acquire the knowledge of learning concepts and leadership styles to achieve high performance levels

Unit – I :

Introduction, Perception and Attribution

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context –Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organisational Behaviour

Cognitive Process I: Perception and Attribution: Meaning of Perception, Nature and importance of Perception — Sensation versus Perception - Perceptual selectivity and organization – Social perception.

Attribution: Meaning - Attribution Theories – Fritz heider's theory of attribution; Jones & Davis correspondent inference theory; Kelley's Covariation Model; and Weiner's Three-Dimensional Model - Locus of control –Attribution Errors – Impression Management – Types - Strategies of Impression Management.

Unit – II :
Personality, Attitudes and Motivation
Cognitive Process II: Personality and Attitudes - Personality as a continuum – Meaning of personality, Personality Traits - Johari Window and Transactional Analysis.

Attitudes: Nature and Dimension of Attitudes - Job satisfaction and organizational commitment.

Motivation: Motivational needs and processes- Work-Motivation Approaches Theories of Motivation– the content theories of motivation: Maslow's hierarchy of needs; Herzberg's two factor theory of motivation; Alderfer's ERG theory – The process theories of work motivation: Vroom's expectancy theory of motivation; the Porter-Lawler's model -Motivation across cultures -Positive organizational behaviour: Optimism - Emotional intelligence - Self-Efficacy.

Unit – III :
Communication, Decision-Making, Stress and Conflict
Dynamics of OB - I: Communication: Meaning and types - interactive communication in organizations – barriers to communication and strategies to improve the flow of communication.

Decision Making: Participative decision-making techniques –creativity and group decision making.

Dynamics of OB – II: Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict -strategies to cope with stress and conflict.

Unit – IV :
Power and Empowerment
Dynamics of OB-III Power: Meaning -Types of power – Legitimate power, Coercive power, Expert power, Informal power and Referent power.

Empowerment – Benefits, Process, Determinants, Techniques of Empowerment; Groups Vs. Teams –Nature of groups –dynamics of informal groups – Dysfunctions of groups and teams –Teams in modern work place.

Unit – V :

High performance, Learning and Leadership

Leading High performance: Job design and Goal setting for High Performance-Quality of Work Life-Socio technical Design and High-performance work practices - Behavioural performance management.

 Learning: Reinforcement and Punishment as principles of Learning – Process of Behavioural modification

Leadership: Definition of leadership – Traits of effective leaders- Leadership behaviour Vs Traits –Leadership skills – Leadership theories: Trait theories; Behavioural theories; Contingency approaches to leadership – Leadership Styles-Autocratic Leadership style, Democratic Leadership style, Free rein Leadership style, Activities and skills of Great leaders.

Suggested Readings :

1. Luthans, Fred: Organizational Behavior, McGraw-Hill, 10th Edition, 2009
2. Robbins, P. Stephen, Timothy A. Judge: Organizational Behavior, PHI/Pearson, 12th Edition, 2009.
3. Pareek Udai: Behavioral Process at Work: Oxford & IBH, New Delhi, 2009.

Reference Books:

1. Schermerhorn: Organizational Behavior Wiley, 9th Edition, 2008.
2. Michael A Hitt: Organizational Behavior, Wiley, 2008
3. Aswathappa: Organizational Behavior, Himalaya, 2009

L	T	P	C
3	0	0	3

VII Semester Syllabus
IT701PC : Information Security

Course Objectives :

- To understand the fundamentals of Cryptography
- To understand various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world application

Course Outcomes :

- Demonstrate the knowledge of cryptography, network security concepts and applications.
- Ability to apply security principles in system design.
- Identify the security issues in the network and resolve it.
- Analyse the vulnerabilities in any computing system and hence be able to design a security solution.
- Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.

Unit – I: Security Attacks :

Interruption, Interception, Modification and Fabrication, Security Services - Confidentiality, Authentication, Integrity, Non-repudiation, Access Control and Availability and Security Mechanisms, A model for Internetwork security, Classical Encryption Techniques - Substitution and Transposition ciphers(Caesar, Vigenere, Monoalphabetic, playfair, Rail fence, Simple columnar transposition ciphers) Block Cipher Design Principles and Modes of operations (ECB,CBC,CFB,OFB,CTR), Differential and Linear Cryptanalysis, Placement of Encryption Function(Link encryption and End to End encryption),key Distribution, Random Number Generation.

Unit – II : Conventional encryption algorithms :

DES, AES, IDEA ,Blowfish. Public key Cryptography Principles, RSA algorithm, Elgamal encryption, Key Management, Diffie-Hellman Key Exchange, Message authentication (Message encryption, MAC, Hash function), Authentication Requirements and Functions, Hash Functions, MACs Hash and MAC Algorithms SHA-512, HMAC,CMAC.

Unit – III : Digital Signatures :

Direct digital signature, Elgamal digital signature, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos -Simple Authentication and more secure Authentication ,version 4,version 5 Authentication dialogues, Realms, X.509 Directory Authentication Service - certificate Format, Certificate Revocation List, Public key infrastructure.

Unit – IV : Email Security :

Pretty Good Privacy (PGP) - Services, Message format and S/MIME - Enveloped data, Signed data, Clear Signed, Signed and Enveloped data.

IP Security: Overview, IP Security Architecture, Applications, IP Sec documents, Authentication Header, Encapsulating Security Payload, IP Sec Services-transport and tunnel modes , Anti replay service, Combining Security Associations ,Basic combinations of security associations and Key Management.

Web Security: Web Security Requirements, Secure Socket Layer (SSL) - Architecture, connection, session, SSL Handshake, Transport Layer Security (TLS) pseudo random function, alert codes, cipher suites, Secure Electronic Transaction (SET),HTTPS

Unit – V : Intruders :

Intrusion Techniques Intrusion Detection, Types of viruses and Worms(state of worm technology), Viruses and Related Threats - Malicious programs, Logic bomb, Trojan horses , Firewalls: Firewall Design Principles, Characteristics, types, Configurations.

Trusted Systems – Data access control, Trojan Horse Defence.

Suggested Readings :

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education, 4th Edition.

Reference Books :

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Principles of Information Security, Whitman, Thomson.

	L	T	P	C
	3	0	0	3

V Semester Syllabus
IT711PE: Machine Learning
(Professional Elective – III)

Course Objectives :

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

Course Outcomes :

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

Unit – I : Introduction :

Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

Unit – II : Artificial Neural Networks-1 :

Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and theback-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

Unit – III : Bayesian learning :

Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

Unit – IV : Genetic Algorithms :

Motivation, Genetic algorithms, an illustrative example, hypothesis Space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, invertingre solution.

Reinforcement Learning–Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

Unit – V : Analytical Learning-1

Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning–Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

Suggested Readings :

1. Tom M. Mitchell, "Machine Learning", MGH

Reference Books :

1. Stephen Marshland, "Machine Learning: An Algorithmic Perspective", Taylor & Francis

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VI Semester Syllabus
IT712PE: Mobile Application Development
(Professional Elective – III)

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L	T	P	C
3	0	0	3

Course Objectives :

- To demonstrate their understanding of the fundamentals of Android operating systems.
- To improves their skills of using Android software development tools.
- To demonstrate their ability to develop software with reasonable complexity on mobile platform.
- To demonstrate their ability to deploy software to mobile devices.
- To demonstrate their ability to debug programs running on mobile devices.

Course Outcomes :

- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Student will be able to develop, deploy and maintain the Android Applications.

Unit – I :

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Unit – II :

Android User Interface: Measurements – Device and pixel density independent measuring units
Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

Unit – III :

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

Unit – IV :

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Unit – V :

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting

retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

Suggested Readings :

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.

Reference Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

VII Semester Syllabus
CS712PE: Full Stack Development
(Professional Elective-III)
(Common to CSE & IT)

L	T	P	C
3	0	0	3

Prerequisites : Basic web development (HTML & CSS) and basic Python knowledge

Course Objectives :

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with front end programming like HTML
- To be familiarized with python web framework like Django.

Course Outcomes :

- Develop essential programming skills in computer programming concepts like data types, containers.
- Apply the basics of programming in the Python language.
- Solve coding tasks related Exceptions and Functions.
- Solve coding tasks related to the fundamental notions and techniques used in python web framework
- Solve coding tasks related to Django..

Unit – I :

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Python – Tools ,Syntaxes and Data Structures.

Unit – II :

HTML:HTML , DJango ,HTML Basic, Elements , Attributes , Headings,HTML Paragraphs , Styles , Formatting , CommentsHTML – Colors , CSS, links, images,tables, HTML – Forms, Form Attributes , Form Elements, HTML – Input Types, Input Attributes, Input Form Attributes.

Unit – III :

Django:

Django – Installation, Project, Virtual Environment SetupAdmin Interface , Django App , MVT

Django model , view , Template,URL Mapping, Static files handling , Model Forms , Django Forms , Form Validation , File upload , Database Connectivity , Database Migrations , Django Middleware,Requestand Response , Django Exceptions.

Unit – IV :

Django session,cookie:

Django Session , Django cookie ,Django CSV Output , Django PDF Output ,Django and Bootstrap, Deploy on Github Django Mail Setup , Django Default CRUD , CRUD Application,Django Redirects , Django on delete , Django Class Based Generic views

Unit – V :

Django UserCreationForm , Django Image Upload , Django ORM Queries ,Django Form widget ,

Ruby on Rails vs. Django, Select related and prefetchrelated , Django Custom User Model Django User Registration with Email Confirmation , How to use Django widget tweets? Django shortcuts , How to connect MySQL to Django, How to use F() Expression? Python Django MySQL CRUD project setup, Python Django MySQL CRUD Example   .

Suggested Readings :

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2016.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson, 2018.
3. Django: Web Development with Python Dauzon Samuel

Reference Books:

1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press, 2019.
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2017.
3. Core Python Programming, Wesley J.Chun, Second Edition ,Pearson 2007.

e-Resources:

1. https://www.tutorialspoint.com/python3/python_tutorial.pdf
2. https://www.geeksforgeeks.org/django-tutorial
3. https://developer.mozilla.org/en-US/docs/Learn/Server-side/Django

VII Semester Syllabus
CS713PE: IT Operations-II
(Professional Elective-III)
(Common to CSE, IT & ECE)

L	T	P	C
3	0	0	3

Course Objectives :

- Learn concepts of Virtualization and Big Data Tools
- To understand SRE Principles, Service Now Workflows and Management

Course Outcomes :

- Demonstrated the concepts of Virtualization
- Discuss the different methods and tools of Bigdata
- Review the principles and practices of SRE
- Interpret and understand the case studies of service now and RPA

Unit – I :
Introduction to Cloud: Introduction to Virtualization, Types of hardware Virtualization, Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization. Layers in cloud architecture, Types of Cloud Services, VMware Virtualization, CloudSim Simulator.

Unit – II :
Big Data & Data Science: Introduction, Trends of Computing for Big Data, Big Data Overview, Big Data Tools – HADOOP, Advanced Analytical Theory and methods, High-performance Networking for Big Data.

Unit – III :
Site Reliability Engineering (SRE): Introduction, Overview of Agile, ITSM. SRE Principles and Practices, Service Level Objectives, Error Budgets. Toil Management, Monitoring and Service Level Indicators, CI-CD Tools and Automation.

Unit – IV :
Introduction to ServiceNOW: Core Configuration, User Administration, Manage Data, Process Applications, Workflows, Case Studies.

Unit – V :
Robotic Process Automation: Robotic Automation Process, Process Flow, Inputs and outputs, Error Management, Case Management.

Suggested Readings / Reference Books:

1. Intelligent Automation by Pascal Bornet, Ian Barkin&JochenWirtz
2. IT Operations Management, ServiceNow EBook David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Centre, Auerbach

3. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

4. Cloud Computing (Principles and Paradigms), Edited by RajkumarBuyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

5. Business Analytics: The Science of Data - Driven Decision Making, U Dinesh Kumar, John Wiley & Sons.
6. Introducing Data Science: Big Data, Machine Learning, and More, Using PythonTools, Davy Cielen, John Wiley & Sons.

	L	T	P	C

VII Semester Syllabus

IT713PE : Web & Database Security

L	T	P	C
3	0	0	3

(Professional Elective – IV)

Course Objectives :

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes :

- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand the access control policies for database Security
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

Unit – I : Web Technology :

The Web Security Landscape: The Web Security Problem, Risk Analysis and Best Practices. **Cryptography and the Web :** Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography.
Digital Identification I: Passwords, Biometrics, and Digital Signatures : Physical Identification- Computer-Based Identification Techniques, Using Public Keys for Identification , Real-World Public Key Examples : Document Author Identification Using PGP, Public Key Authentication Using SSH,
Digital Identification II: Digital Certificates, CAs, and PKI : Understanding Digital Certificates with PGP, Certification Authorities: Third-Party Registrars, Public Key Infrastructure.

Unit – II: Privacy and Security for Users :

The Web's War on Your Privacy : Understanding Privacy, User-Provided Information, Log Files, Understanding Cookies, Web Bugs
Privacy-Protecting Techniques: Choosing a Good Service Provider, Picking a Great Password, Sharing Passwords, Beware of Password Sniffers and Stealers, Cleaning Up After Yourself, Avoiding Spam and Junk Email, Identity Theft, Backups and Antitheft: Using Backups to Protect Your Data, Preventing Theft.
Web Server Security: Physical Security for Servers, Host Security for Servers, Securing Web Applications

Unit – III: Database Security :

Recent Advances in Access Control, Access Control Models for XML, Database

Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems

Unit – IV: Security Re-engineering for Databases :
Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: CurrentCapabilities and Future Trends.

Unit – V: Future Trends Privacy in Database Publishing :
A Bayesian Perspective, Privacy-enhanced Location based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment

Suggested Readings :
1. Simson G Arfinkel, Gene Spafford, "Web Security, Privacy and Commerce", O'Reilly.
2. Michael Gertz, Sushil, "Handbook on Database security applications and trends", Jajodia

VII Semester Syllabus

IT714PE : Data Visualization

(Professional Elective – IV)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn different statistical methods for Data visualization.
- To understand the basics of R and Python.
- To learn usage of Watson studio.
- To understand the usage of the packages like Numpy, pandas and matplotlib.
- To know the functionalities and usages of Seaborn.

Course Outcomes:

After Completion of this course, students would be able to
- Apply statistical methods for Data visualization
- Gain knowledge on R and Python
- Understand usage of various packages in R and Python
- Demonstrate knowledge of Watson studio
- Apply data visualization tools on various datasets

Unit – I: Introduction to Statistics :

Introduction to Statistics, Difference between inferential statistics and descriptive statistics, Inferential Statistics- Drawing Inferences from Data, Random Variables, Normal Probability Distribution, Sampling, Sample Statistics and Sampling Distributions. R overview and Installation- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

Unit – II: Data manipulation with R :

Data manipulation packages- dplyr, datatable, reshape2, tidyr, Lubridate, Data visualization with R. Data visualization in Watson Studio: Adding data to data refinery, Visualization of Data on Watson Studio.

Unit – III: Python :

Introduction to Python, How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas-Creating and Accessing Numpy Arrays, Introduction to pandas, read and write csv, Descriptive statistics using pandas, Working with text data and date time columns, Indexing and selecting data, groupby, Merge / Join datasets

Unit – IV: Data Visualization Tools in Python :

Introduction to Matplotlib, Basic plots using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using Matplotlib Waffle Charts, Word Clouds.

Unit – V: Introduction to Seaborn :

Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

Suggested Readings :

1. Core Python Programming - Second Edition,R. Nageswara Rao, DreamtechPress.
2. Hands on programming with R by Garrett Grolemund,Shroff/O'Reilly; Firstedition
3. Fundamentals of Mathematical Statistics by S.C. Gupta, Sultan Chand &Sons

Reference Books :

1. Learn R for Applied Statistics: With Data Visualizations, Regressions, and Statistics by Eric Goh Ming Hui,Apress
2. Python for Data Analysis by William McKinney, Second Edition, O'Reilly Media Inc.\
3. The Comprehensive R Archive Network-https://cran.r-project.org
4. https://seaborn.pydata.org/
5. https://dataplatform.cloud.ibm.com/

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VII Semester Syllabus
IT715PE : Quantum Computing
(Professional Elective – IV)

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L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

Course Outcomes:

- Understand basics of quantum computing
- Understand physical implementation of Qubit
- Understand Quantum algorithms and their implementation
- Understand the Impact of Quantum Computing on Cryptography

Unit – I : Introduction to Essential Linear Algebra:

Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers.

Unit – II :

Basic Physics for Quantum Computing : The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Basic Quantum Theory : Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

Unit – III :

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture.

Quantum Hardware: Qubits, How Many Qubits Are Needed

Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

Unit – IV :

Quantum Algorithms : What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

Unit – V :

Current Asymmetric Algorithms : RSA, Diffie-Hellman, Elliptic Curve. The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications.

Suggested Readings :

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

Reference Books :

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
3. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

VII Semester Syllabus
CS716PE: Cloud Computing
(Professional Elective-IV)
(Common to CSE, IT, CSE(AI&ML) : PE IV, CSE(Data Science) : PE V))

L	T	P	C
3	0	0	3

Pre-requisites:

Knowledge on Computer Networks, Operating Systems and Distributed Systems.

Course Objectives :

- To know the basics of cloud computing and its advantages.
- To analyze the components of cloud computing and its business perspective.
- To understand various cloud service/deployment models.
- To evaluate the various cloud development tools
- To study various cloud service provider services.

Course Outcomes :

- Ability to understand the fundamentals of cloud computing.
- Understand the architecture of cloud computing model.
- Ability to understand various service and deployment models of cloud.
- Understand the concept of virtualization and its types.
- Understanding cloud service providers and cloud based applications.

Unit – I :

Cloud Computing Fundamentals: Motivation for Cloud Computing, Basic Principles of Cloud computing. Five Essential Characteristics, Four Cloud Deployment Models, Three service Offering Models, Requirements for Cloud Services - Cloud Ecosystem, Cloud Application - Virtualization- approaches and types

Unit – II :

Cloud Computing Architecture and Management: Cloud architecture Layers, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Networking Technologies, Applications on the Cloud, Managing the Cloud application, Migrating Application to Cloud- Phases of Cloud Migration - Approaches for Cloud Migration

Unit – III :

Cloud Deployment Models: Private Cloud, Public cloud, Community Cloud and Hybrid Cloud – Characteristics, Suitability, Issues, Advantages and Disadvantages.
Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service - Characteristics, Suitability, Pros and Cons and Summary.

UNIT – IV

Virtualization technology

Virtual Machine Technology - Types of virtualization - System virtual machines-Virtual machines and elastic computing, Virtual machine migration - Virtualization Applications In Enterprises- Security through virtualization, Desktop virtualization, Server consolidation, Automating infrastructure management, Pitfalls Of Virtualization.

Unit – V :

Cloud Service Providers and Applications: Amazon Web Services, Amazon Elastic Compute Cloud, Google Cloud Platform, Google App Engine, Microsoft Azure, Windows Azure, IBM Cloud Models – Cloud Security issues – Case studies in Cloud Computing and its applications.

Suggested Readings :

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014.

2. "Enterprise Cloud Computing Technology Architecture Applications", Gautam Shroff, Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.

Reference Books:

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra,   Elsevier, 2012.

3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim   Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

VII Semester Syllabus
IT751PC : Information Security Lab

L	T	P	C
0	0	2	1

Course Objectives :

- To understand how to deploy encryption techniques to secure data in transit across data networks
- To apply algorithms used for secure transactions in real world application

Course Outcomes :

After completion of the course, students will be able to
- Demonstrate the knowledge of cryptography, network security concepts and applications.
- Ability to apply security principles in system design

List of Experiments

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithmsa. Caeser cipher b. Rail fence cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the AES/Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Createyour own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Write a C/JAVA program to Implement the Diffie-Hellman Key Exchange mechanism.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

Suggested Readings :

1. William Stallings, " Cryptography and Network Security (principles and approaches)", Pearson Education, 4th Edition.

Reference Books:

1. William Stallings , "Network Security Essentials (Applications and Standards)", Pearson Education.
2. Whitman, "Principles of Information Security", Thomson.

VII Semester Syllabus

IT711PE: Machine Learning Lab

(Professional Elective – III Lab)

L	T	P	C
0	0	2	1

Course Objectives :

- To introduce students to the basic concepts and techniques of Machine Learning
- To improve their skills using Python Programming Libraries like sci-learn and Numpy
- To demonstrate various machine learning techniques
- To demonstrate various machine learning techniques
- To develop skills of using recent machine learning software for solving practical problems

Course Outcomes:

- Compare Machine Learning algorithms based on their advantages and limitations and use the best one according to situation
- Interpret and understand modern notions in data analysis-oriented computing
- Apply Conditional Probability using Bayes Theorem
- Evaluate Decision tree algorithms using real world data
- Experiment with real-world data using Machine Learning algorithms

List of Experiments :

1. Implement the Find-S algorithm for finding the most specific hypothesis based on a given set of training data samples(use enjoysports .CSV file)
2. Implement the decision tree based ID3 algorithm.
3. Implement single layer perceptron.
4. Implement multilayer perceptron with backpropagation.
5. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
6. Implement linear regression using python
7. Implement Naïve Bayes theorem to classify the English text

8. Implement k-nearest neighbors classification using python
9. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR 1	VAR2	CLAS S
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

10. Implement an algorithm to demonstrate the significance of genetic algorithm

VII Semester Syllabus	L	T	P	C
IT712PE: Mobile Application Development Lab	0	0	2	1
(Professional Elective – III Lab)				

Course Objectives :

- To learn how to develop Applications in android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

Course Outcomes :

- Student understands the working of Android OS Practically.
- Student will be able to develop user interfaces.
- Student will be able to develop, deploy and maintain the Android Applications.

List of Experiments

1. (a) Create an Android application that shows Hello + name of the user and run it on an emulator.
    (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user

9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.

10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.

11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.

12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

13. Create an application that shows the given URL (from a text field) in a browser..

Suggested Readings :

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

Reference Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

VII Semester Syllabus
CS712PE: Full Stack Development Lab
(Professional Elective-III)
(Common to CSE & IT)

L	T	P	C
0	0	2	1

Prerequisites : Basic understanding of HTML, CSS & Python

Course Objectives:

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with front end programming like HTML
- To be familiarized with python web framework like Django To be familiarized with general coding techniques and database

Course Outcomes :

- Develop essential programming skills in computer programming concepts like data types, containers.
- Apply the basics of programming in the Python language.
- Solve coding tasks related Exceptions and Functions.
- Solve coding tasks related to the fundamental notions and techniques used in python web framework Solve coding tasks related to Django.

List of Experiments :

1. Calorie Tracker Using Django
2. Weather – App Using Django
3. Plants Identification DL Model Deployment using Django framework
4. Quiz Application Using Django
5. Resume builder using Django
6. Tourism and Travels Prediction System

Suggested Readings :

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2016.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson, 2018.
3. Django: Web Development with Python Dauzon Samuel

Reference Books:

1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press, 2019.
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2017.
3. Core Python Programming, Wesley J.Chun, Second Edition ,Pearson 2007.

e-Resources:

1. https://www.tutorialspoint.com/python3/python_tutorial.pdf
2. https://www.geeksforgeeks.org/django-tutorial
3. https://developer.mozilla.org/en-US/docs/Learn/Server-side/Django

VII Semester Syllabus
CS713PE: IT Operations-II Lab
(Professional Elective-III)
(Common to CSE, IT & ECE)

L	T	P	C
0	0	2	1

Course Objectives:

- Basic Programming Knowledge
- Use of Eclipse IDE.

Course Outcomes:

- Hands on learning on virtual machines and various scenarios on cloud sim.
- Interpret the various case studies on Service Now.

List of Experiments :

1. Install Virtualbox/VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the Virtual Machine created using virtual box and execute Simple Programs
3. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
4. Install Hadoop single node cluster and run simple applications like wordcount.
5. Case Studies on ServiceNOW.
    a. Project Management in ServiceNow from Initiation to Closure.
    b. Resource Management in ServiceNow.
    c. Time Card Management in ServiceNow against Resources and Projects.

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VII Semester Syllabus
IT721OE : Computer Graphics
(Open Elective – III)

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L	T	P	C
2	0	0	2

Course Objectives :

- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;
- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- To learn the basic principles of 3- dimensional computer graphics.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

Course Outcomes :

- Acquire familiarity with the relevant mathematics of computer graphics better analogy data with pictorial representation.
- able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications
- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
- Use of geometric transformations on graphics objects and their application in composite form.

Unit – I: Introduction to CG :
Introduction, **Application areas of Computer Graphics**, **Overview of graphics systems: video-display devices:** CRT, Vector scan/random scan display, raster scan display, colour CRT monitors, direct view storage tubes, flat panel displays
Raster-scan systems: Raster scan display system with video controller Random scan systems, graphics monitors and work stations and input devices.
Output primitives: Points and lines
line drawing algorithms: 1.vector generation/digital analyzer (DDA)Algorithm, 2.bresenham's line algorithm**,**

Antialiasing: 1. super sampling considering zero line width, 2.super sampling considering finite line width, 3.supersampling with pixel-weighting mask, 4.unweighted area sampling, 5.weghted area sampling, 6.filtering techniques

Circle generation algorithms: mid-point circle and ellipse algorithms**.**

Filled area primitives: representation of polygons, entering polygons, an inside test Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms**.**

Unit – II: 2D Transformation :

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations**,** matrix representations and homogeneous coordinates, composite transforms,

Transformations between coordinate systems: co-ordinate systems, transformation between two Cartesian frames of references

2D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation**,** 2Dviewing functions**.**

2D Clipping: point clipping, line clipping, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

Unit – III: 3D Transformation :

3-D Object representation: Polygon surfaces-polygon tables, plane equations, polygon meshes

Quadric Surfaces: Spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

Basic illumination models: Diffuse illumination, point source illumination, specular reflection, combined diffuse and specular reflection**.**

Polygon Rendering Methods: Constant-intensity shading, gouraud shading, polygon shading, halftone shading.

3- Composite transformations: Rotation about arbitrary axis, reflection with respect to given plane

3-D viewing: Viewing pipeline, viewing coordinates, transformation from world co ordinate to viewing co ordinates.

Projections: Parallel projections, perspective projections, types of parallel projections, types of perspective projections, view volume and general projection transforms.

3D clipping:3D midpoint subdivision algorithm.

D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations.

Unit – IV: Surface Detection and Rendering :

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line algorithm, depth sorting, BSP-tree methods, Area sub-division algorithms: warnock's algorithm, weiler-atherton algorithm, buffer algorithm. Octree methods: Octree in space, octree in the view plane Illumination Models and Surface rendering Methods: Basic illumination models, polygon rendering methods

Unit – V: Animation :

Computer animation: Design of animation sequence, general computer animation functions, raster animations, computer animation languages,

Key frame systems: Morphing, motion specifications: goal directed systems, kinematics and dynamics

Suggested Readings :

1. Donald Hearn and M. Pauline Baker, "Computer Graphics C version", Pearson education
2. Zhigand xiang, Roy Plastock, Schaum's outlines , "Computer Graphics Second edition", Tata McGrawhill edition

Reference Books:

1. C. Foley, VanDam, Feiner and Hughes , "Computer Graphics Principles & practice", Pearson Education. second edition
2. David F Rogers, "Procedural elements for Computer Graphics", Tata Mc Graw hill, 2nd edition
3. Neuman and Sproul ,"Principles of Interactive Computer Graphics", TMH.
4. Shalini, Govil-Pai, "Principles of Computer Graphics", Springer

VII Semester Syllabus
CS721OE: Python Programming (Open Elective – III)

L	T	P	C
2	0	0	2

((Except CSE,IT,CSBS,CS(AI&ML), CS(Data Science))

Course Objectives :

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

Course Outcomes :

- Develop essential programming skills in computer programming concepts like data types, containers.
- Apply the basics of programming in the Python language.
- Solve coding tasks related Exceptions and Functions.
- Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming.
- Solve coding tasks related to GUI Programming.

Unit – I :

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.
Data Types and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.
Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.
Repetition Structures: Introduction, while loop, for loop, Input Validation Loops, Nested Loops.

Unit – II :

Sequences: Introduction to Sequences: Strings, Lists, and Tuples, Mapping, Set Types and Dictionaries
String: Strings and Operators, Built-in Methods and Special Features of String. Related Modules.
Lists: Operators, Built-in Functions, List Type Built in Methods, Special Features of List, Related Modules
Tuples: Built-in Functions, Tuple Type Built in Methods, Special Features of Tuples, Related Modules
Mapping and Set Type: Dictionaries, Dictionary Keys, Operators and Built-in Methods. Set type, Operator and Built in Methods. Related Modules.

Unit – III :

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Functions: What are Functions, Defining and Creating functions, Function Arguments: Formal and Variable length, Calling functions, Recursive Functions and Variable Scope.

Modules: Modules, Standard Modules, Importing Modules, Namespaces and Packages.

Unit – IV :

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Design with Classes: Objects and Classes, Data modelling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism.

Unit – V :

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.

Suggested Readings :

  1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2016.
  2. Python Programming: A Modern Approach, VamsiKurama, Pearson, 2018.

Reference Books:

  1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press, 2019.
  2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2017.
  3. Core Python Programming, Wesley J.Chun, Second Edition ,Pearson 2007.

e-Resources:

 https://www.tutorialspoint.com/python3/python_tutorial.pdf

VII Semester Syllabus
CS723OE: **Introduction to Machine Learning**
                    (Open Elective-III)
        (Except CSE,IT,CSBS,CS(AI&ML),CS(Data Structures))

L	T	P	C
2	0	0	2

Prerequisites

1. Data Structures
2. Knowledge on statistical methods

Course Objectives :

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques

Course Outcomes :

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

Unit – I :

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

DecisionTreeLearning–

Introduction,decisiontreerepresentation,appropriateproblemsfordecisiontree
learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning ,inductive bias in decision tree learning, issues in decision tree learning.

Unit – II :

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

Unit – III :

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory–Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

Unit – IV :

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

ReinforcementLearning–Introduction,thelearningtask,Q–learning,non-

deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

Unit – V :

AnalyticalLearning-1- Introduction, learning with perfect domain theories:

PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

AnalyticalLearning-2-

Usingpriorknowledgetoalterthesearchobjective,usingpriorknowledgetoaugmentsearc hoperators.

CombiningInductiveandAnalyticalLearning–Motivation,inductive-

analyticalapproachestolearning,usingpriorknowledgetoinitializethehypothesis.

Suggested Readings :

   1.Machine Learning–TomM.Mitchell,-MGH

Reference Books:

   1.Machine Learning: An Algorithmic Perspective, Stephen Marshl and,Taylor & Francis

Mahatma Gandhi Institute of Technology(Autonomous)
B.Tech. in Information Technology
Scheme of Instruction and Examination
(Choice Based Credit System)
VIII - Semester

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	IT801PC	Data Mining	2	0	0	30	70	3	2
2		Professional Elective – V	3	0	0	30	70	3	3
3		Professional Elective – VI	3	0	0	30	70	3	3
4	IT851PC	Project Stage – II	0	0	16	30	70	-	8
Total Hours / Marks / Credits			**8**	**0**	**16**	**120**	**280**	**-**	**16**

	L	T	P	C
VIII Semester Syllabus	2	0	0	2
IT801PC: Data Mining				

Course Objectives :

- Learn data mining concepts understand association rules mining.
- Discuss classification algorithms learn how data is grouped using clustering techniques.
- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models

Course Outcomes :

- Ability to perform the preprocessing of data and apply mining techniques on it.
- Ability to identify the association rules, classification and clusters in large datasets.
- Ability to solve real world problems in business and scientific information using data mining
- Ability to classify web pages, extracting knowledge from the web

Unit – I : Introduction to Data Warehouses, Data Mining :

Datawarehouses, OLTP vs OLAP, Multidimensional data Model, Schemas, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation;.

Unit – II : Association Rules :

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Mining Frequent Itemsets Using Vertical Data Format,Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

Unit – III : Classification :

Problem Definition, General Approaches to solving a classification problem , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ;

Naive- Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics, Evaluation of Classifiers.

Unit – IV: Clustering :

Measures of Similarity and Dissimilarity- Basics Problem Definition, Clustering Overview, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Evaluation of Clustering Algorithms**,** Outlier Detection.

Unit – V : Web Mining :

Introduction, web mining, web content mining, web structure mining, we usage mining, Data Mining Applications, Data Mining and Society-Ubiquitous and Invisible Data Mining, Privacy, Security and social impacts of Data Mining

Suggested Readings :

1. Jiawei Han, Micheline Kamber, "Data Mining- Concepts and Techniques", Morgan Kaufmann Publishers, Elsevier, 3rd Edition, 2006.
2. Pang-Ning Tan, Vipin Kumar, "Introduction to Data Mining", Michael Steinbanch, Pearson Education.
3. Hongbo Du Cengage , "Data mining Techniques and Applications", India Publishing

Reference Books :

1. Arun K Pujari, "Data Mining Techniques", 3rd Edition, Universities Press.
2. T.V Sveresh Kumar, "Data Mining Principles & Applications", B. Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Vikaram Pudi, P Radha Krishna, Data Mining, Oxford University Press

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VIII Semester Syllabus
IT811PE : Intrusion Detection Systems
(Professional Elective – V)

Prerequisites: Computer Networks, Computer Programming

Course Objectives :

- Compare alternative tools and approaches for Intrusion Detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion.
- Identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share.

Course Outcomes :

After completion of the course, students will be able to:
- Possess a fundamental knowledge of Cyber Security.
- Understand what vulnerability is and how to address most common vulnerabilities.
- Know basic and fundamental risk management principles as it relates to Cyber Security and Mobile Computing.
- Have the knowledge needed to practice safer computing and safeguard your information using Digital Forensics.
- Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems.
- Understand legal perspectives of Cyber Crimes and Cyber Security.

Unit – I : Introduction :

The state of threats against computers, and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's - Overview of Intrusion Detection and Intrusion Prevention, Network and Host-based IDS

Unit – II : Classes of attacks :

Network layer: scans, denial of service, penetration Application layer: software exploits, code injection- Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sop Hesitated groups-Automated: Drones, Worms, Viruses

Unit – III : Models :

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS, Cost sensitive IDS

Unit – IV : Anomaly Detection :

Systems and Algorithms-Network Behaviour Based Anomaly Detectors (rate based)-Host-based Anomaly Detectors-Software Vulnerabilities-State transition, Immunology, Payload Anomaly Detection

Unit – V : Attack trees :

Correlation of alerts- Autopsy of Worms and Botnets-Malware detection-Obfuscation, polymorphism- Document vectors.

Email/IM security issues-Viruses/Spam-From signatures to thumbprints to zero day detection-Insider Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future: Collaborative Security

Suggested Readings :

1. Peter Szor, "The Art of Computer Virus Research and Defense", Symantec Press ISBN 0-321- 30545-3.

2. Markus Jakobsson and Zulfikar Ramzan, Crimeware, "Understanding New Attacks and Defenses".

Reference Books :

1. Saiful Hasan, "Intrusion Detection System", Kindle Edition.

2. Ankit Fadia, "Intrusion Alert: An Ethical Hacking Guide to Intrusion Detection".

VIII Semester Syllabus
IT812PE : Augmented Reality and Virtual Reality
(Professional Elective – V)

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Course Objectives :

- The objective of this course is to provide a foundation to the fast-growing field of AR and make the students aware of the various AR devices.
- To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems

Course Outcomes :

- Describe how AR systems work and list the applications of AR.
- Understand and analyze the hardware requirement of AR.
- Describe how VR systems work and list the applications of VR.
- Understand the design and implementation of the hardware that enables VR systems to be built

Unit - I: Introduction to Augmented Reality:

What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality Augmented Reality Concepts- How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

Unit - II: AR Devices & Components :

AR Components – Scene Generator, Tracking system, monitoring system, display, Game scene. AR Devices – Optical See- Through HMD, Virtual retinal systems, Monitor bases systems, Projection displays, Video see-through systems.

Unit - III: Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

Unit - IV: Representing the Virtual World:

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR, Case Study: GHOST (General Haptics Open Software Toolkit) software development toolkit.

Unit - V: Visual Perception & Rendering:
Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information, Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.

Suggested Readings :
1. Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978- 1484236178
2. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016), ISBN-10: 9332578494

Reference Books :
1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman andAlan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig,William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381.
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0.
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

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VIII Semester Syllabus
CS811PE: Social Networks Analysis
(Professional Elective –V)
(Common to CSE & IT)

Prerequisites :

1. A course on "Web Technologies".
2. A course on "Computer Networks".
3. A course on "Data Warehousing and Data Mining".

Course Objectives :

- It introduces the concepts of social media
- It provides the mechanisms for social network analysis
- Includes the concepts that allow for better visualization and analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

Course Outcomes :

- Ability to construct social network maps easily
- Gain skills in tracking the content flow through the social media
- Use NodeXL to perform social network analysis

Unit – I :

Introduction: Social Media and Social Networks**. Social Media:** New Technologies of Collaboration.
Social Network Analysis: Measuring, Mapping, and Modeling collections of Connections.

Unit – II :

NodeXL, Layout, Visual Design, and Labeling, Calculating and Visualizing Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

Unit – III :

CASE STUDIES - I:
Email: The lifeblood of Modern Communication**. Thread Networks:** Mapping Message Boards and Email Lists. **Twitter:** Conversation, Entertainment and Information.

Unit – IV :

CASE STUDIES - II: Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks

Unit – V :

CASE STUDIES - III:

You Tube: Contrasting Patterns of Content Interaction, and Prominence**.**

Wiki Networks: Connections of Creativity and Collaboration.

Suggested Readings :

1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL:Insights from a Connected World, Morgan Kaufmann, 2011.
2. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.

Reference Books :

1. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and UsingMetrics, 1st Edition, MGH, 2011.

VIII Semester Syllabus
CS814PE: Adhoc & Sensor Networks
(Professional Elective – V)
(*Common to CSE & IT*)

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Prerequisites :

1. A course on "Computer Networks"
2. A course on "Mobile Computing"

Course Objectives :

- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks

Course Outcomes :

- Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
- Ability to solve the issues in real-time application development based on ASN.
- Ability to conduct further research in the domain of ASN

Unit – I :

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology- based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

Unit – II :

Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

Unit – III :

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

Unit – IV :

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensornetworks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

Unit – V :

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

Suggested Readings :

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.

2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

Reference Books:

1. Ad-Hoc Wireless Sensor Networks- C. Siva Ram Murthy,B. S. Manoj, Pearson

2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, 2002, PE

3. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.

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VIII Semester Syllabus **IT813PE: Natural Language Processing** **(Professional Elective – VI)**	3	0	0	3

Course Objectives :

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes :

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques

Unit – I : Finding the Structure of Words :

Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

Unit – II : Syntax Analysis :

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

Unit – III : Semantic Parsing :

Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

Unit – IV : Predicate :

Argument Structure, Meaning Representation Systems, Software.

Unit – V : Discourse Processing :

Cohension, Reference Resolution, Discourse Cohension

Structure Language Modeling : Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

Suggested Readings :

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

Reference Books :

1. Daniel Jurafsky & James H Martin, "Speech and Natural Language Processing ", Pearson Publications

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VIII Semester Syllabus
IT814PE : Human Computer Interaction
(Professional Elective – VI)

Course Objectives :

- To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface. Be able to apply models from cognitive psychology to predicting user performance in various human- computer interaction tasks and recognize the limits of human performance as they apply to computer operation.
- Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user.
- Be familiar with a variety of both conventional and non-traditional user interface paradigms, virtual and augmented reality, mobile and wearable computing, and ubiquitous computing.
- Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems.
- Working in small groups on a product design from start to finish will provide you with invaluable team- work experience.

Course Outcomes :

- Understand the importance of Graphical user interface and human characteristics in design and how people interact with computers.
- Students can articulate and apply common design principles for making good decisions in the design of user interfaces.
- Understand various kinds of components that are available in the screens and windows and their characteristics and have an ability to select the proper device based and screen based controls. Design effective HCI for individuals and persons with disabilities
- Ability to design multimedia/ ecommerce/ e-learning Web sites

Unit – I: Importance of user Interface :

Defining the User Interface, importance of good design: Benefits of good design, The Blossoming of the World Wide Web: A brief history of Screen design.

Characteristics of Graphical and Web User Interfaces: Introduction of the graphical user interface, The Graphical User Interface: popularity of graphics, the concept of direct manipulation

Graphical Systems: Advantages and Disadvantages, Characteristics of the Graphical User Interface,

The Web user Interface: The Popularity of the Web, Characteristics of a Web Interface.

Unit – II: The User Interface Design Process :

Know Your User or Client: Human interaction with computers, importance of human characteristics in Design, Human Considerations in the Design of Business Systems, Human interaction speeds.

Understand the Business Function: Determining Basic Business Functions

Understand the Principles of Good Interface and Screen Design: Human Considerations in Interface and Screen Design: Screen and Web Page Meaning and Purpose, Organizing Elements Clearly and Meaningfully, Ordering of Data and Content, Navigation and Flow, Visually Pleasing Composition, Focus and Emphasis, Presenting Information Simply and Meaningfully

The Web — Web sites and Web Pages: Browsing and Searching, Statistical

Unit – III: The User Interface Design Process :

Develop System Menus and Navigation Schemes: Web Site Navigation, Kinds of Graphical Menus

Select the Proper Kinds of Windows: Window Characteristics, Components of a Window, Window Presentation Styles, Types of Windows, Organizing Window Functions, The Web and the Browser, Select the Proper Interaction Devices, Choose the Proper Screen-Based Controls

Write Clear Text and Messages: Words, Sentences, Messages, and Text, Content and Text for Web Pages.

Create Meaningful Graphics, Icons, and Images: Icons, Multimedia

Graphics Choose the Proper Colors: Color Uses, Possible Problems with Color, Choosing Colors for Textual Graphic Screens, Choosing Colors for Statistical Graphics Screens, Choosing Colors for Web Pages

Unit – IV: HCI in the software process :

The software life cycle, Usability engineering, Iterative design and prototyping- **Design Focus:** Prototyping in practice, Design rationale,

Design rules: Principles to support usability, Standards, Golden rules and heuristics,

HCI patterns. Evaluation techniques: Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method.

Universal design: Universal design principles, Multi-modal interaction- Design Focus: Designing websites for screen readers, Design Focus: Choosing the right kind of speech

Design Focus: Apple Newton

Unit – V : Cognitive models :

Goal and task hierarchies, Design Focus: GOMS saves money, Linguistic models, The challenge of display- based systems, Physical and device models, Cognitive architectures.

Ubiquitous computing and augmented realities: Ubiquitous computing applications research.

Design Focus: Ambient Wood — augmenting the physical, Design Focus: Shared experience, Virtual and augmented reality, Applications of augmented reality, Information and data visualization, Getting the size right.

Suggested Readings :

1. Wilbert O Galitz, "The essential guide to user interface design", Wiley Dream Tech. Units 1, 2, 3
2. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, "Human – Computer Interaction", Pearson Education Units 4,5

Reference Books :

1. Ben Shneidermann, "Designing the user interface", Pearson Education Asia, 3rd Edition
2. Rogers, Sharps. "Interaction Design Prece", Wiley Dreamtech.
3. Soren Lauesen , "User Interface Design", Pearson Education.
4. D. R. Olsen, "Human –Computer Interaction", Cengage Learning.
5. Smith - Atakan, "Human –Computer Interaction", Cengage Learning.

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VIII Semester Syllabus
CS818PE: Neural Networks & Deep Learning
(Professional Elective –VI)
(Common to CSE & IT)

Course Objectives :

- To introduce the foundations of Artificial neural Networks
- To learn various types of Artificial neural Networks
- To acquire knowledge on Deep Learning concepts

Course Outcomes :

- Ability to understand the concepts of Neural Networks
- Ability to use an efficient algorithm for Deep Models
- Ability to select the Learning networks in modelling real world systems

Unit – I :

Basics of artificial neural networks (ANN): Artificial neurons, Computational models of neurons, Structure of neural networks, Feedforward neural networks: Pattern classification using perceprton, Multilayer feedforward neural networks (MLFFNNs), Backpropagation learning.

Unit – II :

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.

Optimization for Train Deep Models: Optimization for training DNNs, Newer optimization methods for neural networks (AdaGrad, RMSProp, Adam), Second order methods for training, Regularization methods (dropout, drop connect, batch normalization)

Unit – III :

Convolution neural networks (CNNs): Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet, Training a CNNs: weights initialization, batch normalization, hyperparameter optimization, Understanding and visualizing CNNs.

Unit – IV :

Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures. Deep Unsupervised Learning: Autoencoders, Variational Auto-encoders, Adversarial Generative Networks, Auto-encoder and DBM Attention and memory models, Dynamic Memory Models

Unit – V:

Applications: Large - Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

Suggested Readings :

1. S. Haykin, *Neural Networks and Learning Machines* , Prentice Hall of India, 2010.
2. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.

Reference Books:

1. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015
2. Satish Kumar, *Neural Networks - A Class Room Approach*, Second Edition, TataMcGraw-Hill, 2013
3. B. Yegnanarayana, *Artificial Neural Networks*, Prentice- Hall of India, 199.

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VIII Semester Syllabus
CS828PE: Blockchain Technology
(Professional Elective–VI)
(Common to IT, CSE(DS))

Prerequisites :
- Knowledge in security and applied cryptography.
- Knowledge in distributed databases

Course Objectives :

- To Introduce block chain technology and Crypto currency.

Course Outcomes :

Students would be able to
- Learn about research advances related to one of the most popular technological areas today.
- Understand Extensibility of Blockchain concepts.
- Understand and Analyze Block chain Science.
- Understand Technical challenges, Business model challenges.

Unit – I :

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowd funding.

Unit – II :

Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment.

Unit – III :

Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bitcoin MOOCs.

Unit – IV :

Currency, Token, Tokenizing, Campus coin ,Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

Unit – V :

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

Suggested Readings :

1. Melanie Swan, Blockchain Blue print for Economy, O'reilly.

Reference Books :

1. Building Block chain Apps, Michael Juntao Yuan, Pearson Education
2. Daniel Drescher, Block chain Basics: A Non-Technical Introduction in 25 Steps 1st Edition
3. Bradley Lakeman, Blockchain Revolution: Understanding the Crypt o Economy of the Future. A Non-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN:1393889158.