IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.) [Computer Science & Engineering (Data Science)]

VI Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work Lab Work & Sessional		L	T	P	
1.	**BSC-CSDS601**	BSC	**Scientific Aptitude**	70	20	10	–	–	**100**	3	1	–	**4**
2.	**PCC-CSDS601**	PCC	**Big Data and Hadoop**	70	20	10	60	40	**200**	2	1	2	**4**
3.	**PCC-CSDS602**	PCC	**Machine Learning**	70	20	10	60	40	**200**	2	1	2	**4**
4.	**PEC-CSDS601**	PEC	**Elective -II**	70	20	10	–	–	**100**	3	–	–	**3**
5.	**OEC-CSDS601**	OEC	**Open Elective-II**	70	20	10	–	–	**100**	3	–	–	**3**
6.	**PROJ-CSDS601**	PROJ	**Project-I**	–	–	–	60	40	**100**	–	–	4	**2**
7.	**PROJ-CSDS602**	PROJ	**Evaluation of Internship-I**	–	–	–	60	40	**100**	–	–	4	**2**
8.	**–**	PROJ	**Internship-II**	To be completed during semester break. Its Evaluation / Credit to be added in Seventh Semester.									
			Total	**350**	**100**	**50**	**240**	**160**	**900**	**13**	**3**	**12**	**22**

Electives-II	**Open Electives-II**
PEC-CSDS601(A) Blockchain Technology	OEC-CSDS601(A) Stress Management
PEC-CSDS601(B) Cyber Security	OEC-CSDS601(B) Business Communication
PEC-CSDS601(C) Natural Language Processing	OEC-CSDS601(C) Foreign Language (German/ French)
PEC-CSDS601(D) Computer Graphics & Multimedia	OEC-CSDS601(D) Digital Marketing & SEO

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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VI Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work Lab Work & Sessional		L	T	P	
1.	**BSC-CSDS601**	BSC	**Scientific Aptitude**	70	20	10	–	–	**100**	3	1	–	**4**
2.	**PCC-CSDS601**	PCC	**Big Data and Hadoop**	70	20	10	60	40	**200**	2	1	2	**4**
3.	**PCC-CSDS602**	PCC	**Machine Learning**	70	20	10	60	40	**200**	2	1	2	**4**
4.	**PEC-CSDS601**	PEC	**Elective -II**	70	20	10	–	–	**100**	3	–	–	**3**
5.	**OEC-CSDS601**	OEC	**Open Elective-II**	70	20	10	–	–	**100**	3	–	–	**3**
6.	**PROJ-CSDS601**	PROJ	**Project-I**	–	–	–	60	40	**100**	–	–	4	**2**
7.	**PROJ-CSDS602**	PROJ	**Evaluation of Internship-I**	–	–	–	60	40	**100**	–	–	4	**2**
8.	**–**	PROJ	**Internship-II**	To be completed during semester break. Its Evaluation / Credit to be added in Seventh Semester.									
			Total	**350**	**100**	**50**	**240**	**160**	**900**	**13**	**3**	**12**	**22**

Electives-II	**Open Electives-II**
PEC-CSDS601(A) Blockchain Technology	OEC-CSDS601(A) Stress Management
PEC-CSDS601(B) Cyber Security	OEC-CSDS601(B) Business Communication
PEC-CSDS601(C) Natural Language Processing	OEC-CSDS601(C) Foreign Language (German/ French)
PEC-CSDS601(D) Computer Graphics & Multimedia	OEC-CSDS601(D) Digital Marketing & SEO

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

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VI-Semester

BSC-CSDS601	**Scientific Aptitude**	**3L: 1T: 0P (4hrs.)**	**4 credits**

Prerequisite: None

Course Objective:
This course aims to sensitize students with the gamut of skills which facilitate them to enhance their employability quotient.

Course Contents :(40 hrs)

Module 1: (10hrs.)
Number System, Percentage, Ratio and Proportion, Partnership, Profit & Loss, Simple & compound Interest.

Module 2: (10 hrs.)
Allegation & Mixture, Average, Time &Distance, Time and Work, Mensuration 2D & 3D, Permutation and Combination.

Module 3: (08 hrs.)
Probability, Co-ordinate Geometry, Inequalities, Functions, Progressions, Set Theory, Quadratic equations, Surds.

Module 4: (06hrs.)
Coding Decoding, Sitting Arrangements, Data sequence/Calendars, Direction Sense Test, Blood Relation.

Module 5: (06hrs.)
Syllogism, series, Analogy Classification, Clocks, Statements and Arguments, Puzzle Test, Cubes and dice.

Course Outcome:
1. Understand the basic concepts of quantitative ability.
2. Applying basic mathematics skills to interpret data, draw conclusions, and solve problems.
3. Developing proficiency in numerical reasoning;
4. Understand the basic concepts of logical reasoning Skills.
5. Develop the puzzle solving skills.

List of Text / Reference Books:

1. R.S. Aggarwal, “Quantitative Aptitude”,S. Chand Publication,RevisedEdition,2018.
2. M. Tyra, “Magical Book on Quicker Maths”, BSC Publishing Co PvtLtd,2018.
3. K.Kundan,“MagicalBookSeries:DataInterpretation”,BSCPublishingCoPvtLtd,2012.
4. H.William Dettmer , “The Logical Thinking process”, Productivity Press(India)Ltd.,2001.
5. Aditi Agarwal, “An expert guide to problem solving: with practicalexamples”, Createspace Independent Pub,2016.
6. George J Summers , “The Great Book of Puzzles &Teasers”, Jaico Publishing House,1989.

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VI-Semester

PCC-CSDS601	**Big Data and Hadoop**	**2L: 1T: 2P (5 hrs.)**	**4 credits**

Prerequisite: Nil

Course Objective:
To study the basic technologies that forms the foundations of Big Data.

Course Contents :(40 hrs)

Module 1: (06 hrs.)
Introduction to BigData Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

Module 2: (15 hrs.)
Need of Hadoop, Data centers and Hadoop Cluster overview, Overview of Hadoop Daemons, Hadoop Cluster and Racks, Learning Linux required for Hadoop, Hadoop ecosystem tools overview, Big data Hadoop opportunities

Module 3: (6 hrs.)
HDFS Daemons – Namenode, Datanode, Secondary Namenode, Hadoop FS and Processing Environment's UIs, Fault Tolerant, High Availability, Block Replication, Hadoop Processing Framework: YARN Daemons – Resource Manager, NodeManager, Job assignment & Execution flow, MapReduce Architecture, MapReduce life cycle, Word Count Example(or) Election Vote Count.

Module 4: (06 hrs.)
Introducing Hadoop Hive, Detailed architecture of Hive, Comparing Hive with Pig and RDBMS, Working with Hive Query Language, Creation of a database, table, group by and other clauses, Various types of Hive tables, HCatalog, Storing the Hive Results, Hive partitioning, and Buckets

Module 5: **(07 hrs.)**

Introduction to Hadoop Framework: Spark and Scala, Apache Pig: Advantage of Pig over MapReduce, Pig vs Hive Use case, Introduction to HBASE, Fundamentals of HBase, SQL vs. NOSQL, Application of Sqoop, Flume, Oozie

Course Outcome:

1. Explain the statistics of Big Data
2. Identify Hadoop EcoSystem
3. Understand HDFS and Mapreduce algorithm
4. Articulate innovative insights of Hive
5. Identify and utilise various Hadoop tools

List of Text / Reference Books:

1.Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley

2.DT Editorial Services, Big-Data Black Book, Wiley

3.Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill.

4.Thomas Erl, Wajid Khattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers and Techniques", Prentice Hall.

5.Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons

6.ArshdeepBahga, Vijay Madisetti, "Big Data Science & Analytics: A HandsOn Approach ", VPT

7.nand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP

8.Tom White, "Hadoop: The Definitive Guide", O'Reilly.

List of Experiments:

1. To Study of Big Data Analytics and Hadoop Architecture.
2. To Understand Overall programming architecture of Map reduce API. Implement MapReduce Programming.
3. To Study HDFS Commands.
4. To Study serializes and deserializes data of integer type in Hadoop.
5. To run a basic Word Count MapReduce program to understand MapReduce Paradigm.
6. Basic CRUD operations in MongoDB.
7. Store the basic information about students such as roll no and name using various collection types Map.
8. To run a Grep program on Hadoop to understand Mapreduce Paradigm: To count words in a given file, To view the output file, and To calculate execution time.
9. Installation of SPARK framework with or without Hadoop framework.
10. To Study about the Hive commands using HQL (DDL and DML).

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VI-Semester

PCC-CSDS602	**Machine Learning**	**2L: 1T: 2P (5 hrs.)**	**4 credits**

Course Objective:

The main objective of this course is to understand fundamental of machine learning.

Course Contents: (41 hrs.)

Module 1: **(09 hrs.)**

Preliminaries, what is machine learning; varieties of machine learning, learning input/output functions, Boolean functions and their classes, CNF, DNF, decision lists. Version spaces for learning, version graphs, learning search of a version space, candidate elimination methods

Module 2: **(07hrs.)**

Threshold learning units, Training of feed forward networks by back propagations, Neural Networks, threshold logic units, linear machines, networks of neural networks vs. knowledge-based systems

Module 3: **(07 hrs.)**

Networks, nearest neighbor. Decision-trees, supervised learning of uni-variance decision Statistical Learning, background and general method, learning belief trees, network equivalent of decision trees, over fitting and evaluation.

Module 4: **(07 hrs.)**

Inductive Logic Programming, notation and definitions, introducing recursive programs, inductive logic programming vs decision tree induction.

Module 5: **(12 hrs.)**

Computational learning theory, fundamental theorem, Vapnik- Chernonenkis dimension, linear dichotomies and capacity. Unsupervised learning, clustering methods based on Euclidian distance and probabilities, hierarchical clustering methods. Introduction to reinforcement and explanation-based learning.

Course Outcomes:

1. Explain fundamentals of Machine learning using function implementation.
2. Apply threshold learning using feed forward neural networks.
3. Explain descion trees for uni variance Statistical Learning.
4. Apply Inductive Logic Programming.
5. Understand unsupervised machine learning techniques and notion of distances.

List of Text / Reference Books:

1. Introduction to Machine learning, Nils J.Nilsson
2. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch
3. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly

List of Experiments

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV le
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm. Output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library lasses/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library lasses/API in the program..
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem..
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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VI-Semester **Elective-II**

PEC-CSDS601(A)	**Blockchain Technology**	**3L: 0T: 0P (3 hrs.)**	**3credits**

Prerequisite: Nil

Course Objective:
Understand how blockchain systems (mainly Bitcoin and Ethereum) work.

Course Contents :(40 hrs)

Module 1: (08 hrs.)
Introduction to Blockchain: Blockchain- Public Ledgers, Blockchain as Public Ledgers - Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree.

Module 2: (08 hrs.)
Bitcoin and Cryptocurrency: A basic crypto currency, Creation of coins, Payments and double spending, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

Module 3: (08 hrs.)
Bitcoin Consensus: Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains.

Module 4: (07 hrs.)

Hyper Ledger Fabric & Etherum: Architecture of Hyperledger fabric v1.1-Introduction to hyperledger fabric v1.1, chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts.

Module 5: Blockchain Applications and Security: (09 hrs.)

Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases –Finance.

Hyperledger System architecture, ledger format, chaincode, transaction flow and ordering, private channels, membership service providers, case studies

Course Outcome:

1. Understand basics of Blockchain Technology.
2. Understand basics of Bitcoin and Cryptocurrency
3. Understand various consensus protocol and their usage for their specific application
4. Apply hyperledger Fabric and Etherum platform to implement the Block chain Application.
5. Understand and Resolve security concern in blockchain

List of Text / Reference Books:

1. Mastering Bitcoin:Unblocking Digital Cryptocurrencies, by Andreas Antonopoulos

2. Bitcoin and Cryptocurrencies Technologies: A Comprehensive Introduction, Arvind Narayanan, Princeton University Press(July 19,2016)ISBN-10:0691171696

3. Mastering Ethereum, Antonopoulos, Andreas M. and Wood, O'Reilly Media,Inc.,2018

4. An Introduction to Bitcoin, V. Saravanan, Lecture Notes

5. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran,2017.

6. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.

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VI-Semester **Elective-II**

PEC-CSDS601(B)	**Cyber Security**	**3L: 0T: 0P (3 hrs.)**	**3 credits**

Prerequisite: None

Course Objective:
Analyze and resolve security issues in an organization to secure an IT infrastructure.

Course Contents :(40 hrs)

Module 1: **(06hrs.)**

Introduction of Cyber Crime, Challenges of cyber crime, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique.

Module 2: **(8 hrs.)**

Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime, Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers were hacking, session hijacking.

Module 3: **(10 hrs.)**

Cyber Crime and Criminal justice: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E- mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime andTrends.

Module 4: **(10 hrs.)**

The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving ElectronicMessages.

Module 5: (06hrs.)

Tools and Methods in Cybercrime: Proxy Servers and Anonymizers,PasswordCracking, Key loggers and Spyware, virusand worms, Trojan Horses, Backdoors, DoS and DDoS Attacks , Buffer and Overflow, Attack on Wireless Networks, Phishing : Method of Phishing, Phishing Techniques. Introduction to KALILinux.

Course Outcome:

1. Define and explain the concepts of cyber crime and its classification.
2. Delineate the components online frauds, intrusions, virtual crimes andhacking.
3. Knowledge of different act's in cybersecurity
4. List the various parts of IT act related to electronicrecords.
5. Knowledge of different Cyber Securitytools.

List of Text / Reference Books:

1. Jonathan Clough, "Principles of Cyber crime", Cambridge University Press, 2ndEdition, 2015.
2. John R. Vacca, " Computer Forensics: Computer Crime Scene Investigation", CharlesRiverMedia, 2ndEdition,2005.
3. Vivek Sood"Cyber Law Simplified",TMH,2001.
4. Nina Godbole, SunitBelapure , "Cyber Security",Wiley-India
5. William Hutchinson, Mathew Warren, "Information Warfare: Corporate attack and defense in digital world" , Elsevier, Reed International and Professional Publishing Ltd,2001
6. Harish Chander , "Cyber Laws and IT Protection", Prentice Hall India Learning Private Limited,2012

Perspectives:

1. Computer security, cyber security or any other related terminology is the protection of computers from any harm or damage, either physical or otherwise, by unauthorized users.
2. Cyber Security is a very broad term but is based on three fundamental concepts known as "The CIA Triad". It consists of Confidentiality, Integrity, and Availability.
3. Cyber Security study programmers teach you how to protect computer operating systems, networks, and data from cyber attacks.
4. Confidentiality, honesty, and availability are three basic security principles that are essential for information on the internet.

Recommendations:

Students pursuing a concentration in **Cyber Security** must also take the following concentration Requirements and electives:
Cyber Security are more popular than ever. Living in the digital age means hackers and cyber terrorists have endless opportunities to exploit individuals, government institutions, and even Large companies

1. Project-I
2. Project-II
3. Project-III
4. Mobile Application Development

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VI-Semester **Elective-II**

PEC-CSDS601(C)	**Natural Language Processing**	**3L: 0T: 0P (3 hrs.)**	**3 credits**

Prerequisite: Engineering Mathematics

Course Objective:

To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Course Contents :(40 hrs)

Module 1: **(06 hrs.)**

Introduction to Natural Language Understanding- Levels of language analysis-Syntax, Semantics, Pragmatics, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spellingerrors.

Module2: **(10hrs.)**

Computational Phonology: speech sound, phonetic transcription, text to speech, Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata,N-grams.

Module3: **(10 hrs.)**

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

Module4: **(08 hrs.)**

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.

Module5: **(06 hrs.)**

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

Course Outcome:

1. To tag a given text with basic Languagefeatures
2. To design an innovative application using NLPcomponents
3. To implement a rule based system to tackle morphology/syntax of alanguage
4. To design a tag set to be used for statistical processing for real-timeapplications
5. To compare and contrast the useof different statistical approaches for different types of NLPapplications.

List of Text / Reference Books:

1.D. Jurafsky and J.H. Martin, "Speech and Language Processing; Processing",Prentice Hall,2000.

2.C. Manning and H. Schutze,"Foundations of Statistical Natural Language Processing", MIT Press

3.James Allen."Natural Language Understanding", Addison Wesley,1994.

4.Richard M Reese, "Natural Language Processing with Javall", OReilly Media,2015.

5.Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and InformationRetrieval", Oxford University Press,2008

Perspectives:

1. Natural language processing (NLP) is a branch of artificial intelligence that helps computers understand, interpret and manipulate human language.
2. NLP (Natural Language Processing) Concerned with building computational tools that do useful things with language.
3. NLP includes text-to-speech or speech-to-text conversion; machine translation from one language to another; categorizing, indexing, and summarizing written documents; and identifying mood and Opinions within text- and voice-based data.

Recommendations:

Students pursuing a concentration in **Natural Language Processing** must also take the following concentration requirements and electives:

1. Computational Intelligence
2. Pattern Recognition
3. Web & Information Retrieval
4. Semantic Web & Ontology's.

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VI-Semester **Elective-II**

PEC-CSDS601(D)	**Computer Graphics & Multimedia**	**3L: 0T: 0P (3 hrs.)**	**3 credits**

Course Objective:

To equip students with the fundamental knowledge and basic technical competence in the fieldof computer graphics.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing algorithms: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms.

Module 2: **(08 hrs.)**

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogeneous coordinate system, Matrice Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms

Module 3: **(08 hrs.)**

3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z- Buffer Algorithm. Curve generation, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV

Module 4: **(08 hrs.)**

Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization, Basic Animation Techniques like traditional, key framing.

Module 5: **(10 hrs.)**

Multimedia :Basic of multimedia, application of Multimedia, Text-Types, Unicode Standard ,text Compression, Text file formats, Audio Components, Digital Audio, Digital Audio processing, Sound cards, Audio file formats ,Audio Processing software ,Video- Video color spaces, Digital Video, Digital Video processing, Video file formats. Animation: Uses of Animation, Principles of Animation, Computer based animation, 3D Animation, Animation file formats, Animation software, Special Effects in animation, Storyboarding for Animation, Compression: Lossless/Lossy Compression techniques, Image, Audio & Video Compression, MPEG Standards ,Multimedia Architecture, Multimedia databases.

Course Outcome:

1. Understand the basic concepts of Computer Graphics.
2. Demonstrate various algorithms for scan conversion and filling of basic objects andtheircomparative analysis.
3. Apply geometric transformations, viewing and clipping on graphical objects.
4. Explore solid model representation techniques and projections.
5. Understand visible surface detection techniques and illumination models

List of Text / Reference Books:

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.
2. Foley, V a n D a m, F e i n e r , H u g h e s , “ Computer G r a p h i c s : Principles a nd P r a c t i c e ” Pearson Education India, Third Edition,2013
3. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
4. Ranjan Parekh “Principles of Multimedia”, Tata McGraw-Hill Education, 2006
5. Rajesh K Maurya, “Computer Graphics with Virtual Reality System “, Wiley India, 2009
6. Pakhira,”Computer Graphics, Multimedia & Animation”, PHI learning

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VI-Semester **Open Elective-II**

OEC-CSDS601(A)	**Stress Management**	**3L:0T:0P (3hrs)**	**3 Credits**

Course Objectives

The objective of this course is to enable students to understand and learn how to use varioustechniques and determine the most appropriate method to aid in managing reaction to stress.

Course Outcomes

Identify, describe and practice research-based coping strategies and relaxation techniques that contribute to managing life's stress.

Course Contents

Module-I

Introduction to Stress

Introduction to stress: Meaning, Definition, Eustress and Distress, Types of stress: Acute stress, Episodic Acute stress and chronic stress, Signs and Symptoms

Module -II

Sources of Stress across the Lifespan

Psychological, Social, Environmental, Academic, Family and Work stress, Adaptive and Maladaptive Behavior, Individual and Cultural Differences

Module - III

Impact of Stress

Physiological Impact of stress -Autonomic Nervous System Changes, Changes in Brain, General adaptive syndrome (GAD), Quality of sleep, Diet and Health effects (ii) Psychological Impact of stress - Impaired Mental functions, Poor memory (iii) Social Impact of stress - Stressful Life Events, Social support and health

Module - IV

Success over Stress

Understanding your stress level, Role of Personality Pattern, Self Esteem, Locus of Control, Roleof Thoughts Beliefs and Emotions Coping Mechanisms: - Coping Mechanisms: Appraisal focus Use of Audio and Video Aids , Cultural Activities, Autogenic Training, Biofeedback, Relaxation, Yoga and Meditation Emotional focused and Problem focused , 'Fight or Flight' Response, Stress warning signals

Module –V

Project based learning

Project report on Stress Management (Students will prepare and submit a report under the guidance of the mentors)

Text Books:

1. Greenberg, J. S. (2017). Comprehensive Stress Management (14th edition). New York: McGraw Hill.
2. Roy, Sumita. (2005) Managing Stress: Handle, Control, Prevent Sterling Publisher
3. Davis M. (2000) *The Relaxation and Stress Reduction Work Book*, New Harbinger inc.
4. Simmons M., Daw W. (1994) *Stress, Anxiety, Depression: a Practical Workbook,* Winslow Press.
5. Tyler M. (1999) *Stress Management Training for Trainers Handbook,* Living with StressLtd
6. Udai, Y. (2015). Yogasan aur pranayam. New Delhi: N.S. Publications

Reference Books:

1. Cooper K. (1991) *Overcoming Hypertension,* Bantam Books.
2. Hambly K., Muir A. (1997) *Stress Management in Primary Care*, Butterworth Heinemann.
3. Jones H. (1997) *I'm too Busy to be Stressed*, Hodder and Stoughton
4. Payne R. (1995) *Relaxation Techniques: a Practical Handbook for HealthcareProfessionals,* Churchill Livingstone.
5. Steinmetz J. (1980) *Managing Stress Before it Manages You,* Bull Publishing.

IPS Academy, Institute of Engineering & Science
(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum
Department of Computer Science & Engineering
Bachelor of Technology (B.Tech.)
[Computer Science & Engineering (Data Science)]

VI-Semester **Open Elective-II**

OEC-CSDS601(D)	**Digital Marketing & SEO**	**3L:0T:0P (3hrs)**	**3 Credits**

Course Objective:
The objective of subject is to facilitate students to understand digital marketing and its importance.

Course Contents: (40 hrs.)

Module 1: **(08 hrs)**
Digital Marketing: Introduction, Moving from Traditional to Digital Marketing, Integrating Traditional and Digital Marketing, Reasons for Growth. Need for a comprehensive Digital Marketing Strategy. Concepts: Search Engine Optimization (SEO); Concept of Pay Per Click

Module 2: **(08 hrs)**
Social Media Marketing: Introduction, Process - Goals, Channels, Implementation, Analyze. Tools: Google and the Search Engine, Facebook, Twitter, YouTube and LinkedIn. Issues: Credibility, Fake News, Paid Influencers; Social Media and Hate/ Phobic campaigns. Analytics and linkage with Social Media. The Social Community.

Module 3: **(08 hrs)**
Email Marketing: Introduction, email marketing process, design and content, delivery, discovery. Mobile Marketing: Introduction and concept, Process of mobile marketing: goals, setup, monitor, analyze; Enhancing Digital Experiences with Mobile Apps. Pros and Cons; Targeted advertising. Issues: Data Collection, Privacy, Data Mining, Money and Apps, Security, Spam. Growth Areas.

Module 4: **(08hrs)**
Managing Digital Marketing: Content Production; Video based marketing; Credibility and Digital Marketing; IoT; User Experience; Future of Digital Marketing.

Module 5: **(08 hrs)**

SEO Analytics, Monitoring & Reporting : Google Search Console (GSC),Key Sections & Features of GSC; How to monitor SEO progress with Key Features of GSC: Overview, Performance, URL Inspection, Coverage, Sitemaps, Speed, Mobile Usability, Backlinks, Referring Domains, Security& Manual Actions, How to do SEO Reporting.

Course Outcome:

1. Understand the concept of digital marketing and its real-world iterations.
2. Articulate innovative insights of digital marketing enabling a competitive edge.
3. Understand how to create and run digital media based campaigns.
4. Identify and utilise various tools such as social media etc.
5. Understand how to do SEO Audit.

List of Text / Reference Books:

1. Dodson, Ian, " The Art of Digital Marketing - The Definitive Guide to Creating Strategic", Targeted, and Measurable OnlineCampaigns. Wiley, 2016.
2. Ryan, Damien, " Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation", Kogan Page Limited, 2008.
3. Gupta, Sunil, "Driving Digital Strategy" Harvard Business Review Press, 2018.
4. Tuten, Tracy L. and Solomon, Michael R. "Social Media Marketing", Sage, 3rd edition 2017.
5. Bhatia, Puneet S." Fundamentals of Digital Marketing", Pearson, 2nd edition, 2019.
6. Kotler, Philip "Marketing 4.0: Moving from Traditional to Digital", Wiley, 1st edition, 2017.