DEPARTMENT OF PG COMPUTER SCIENCE

List of Board of Studies Members

S. No	Name of the Staff member, Designation & College	Role	Signature
1	**Sri. Ch. Anil Kumar** Head, Department of PG Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 9701463015, Email Id: aniltimes13@gmail.com	Chairman	
2	**Dr. M. Babu Reddy** Assistant Professor, Department of Computer Science, Krishna University, Machilipatnam Mobile No. 9963436460, Email id: m_babureddy@yahoo.com	University Nominee	*Attended the meeting online*
3	**Dr. D. G. Krishna Mohan** Associate Professor, Department of CSE (AI & ML), Vishnu Institute of Technology, Bhimavaram Mobile: 8297313195, Email id: krishnaugcnet@gmail.com	Subject Expert	*Attended the meeting online*
4	**Dr. Yugandhar Garapati** Assistant Professor, Department of CSE, GITAM deemed to be University, Hyderabad Mobile: 9866688563, Email id: yugandhar.garapati@gmail.com	Subject Expert	*Attended the meeting online*
5	**R. Sowjanya** Senior Developer, Capgemini, Gachibowli, Hyderabad, Mobile: 9542095699, Email id:sowji.rajulapati@gmail.com	Industrial Expert	*Attended the meeting online*
6	**Mr. S. Naveen** Software Engineer, HCL Tech, Vijayawada, Mobile No. 9603064138, Email Id: naveen.sandaka@hcl.com	Alumnus	*Attended the meeting online*
7	**Ms. G. Katyayini** Assistant Professor in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 9553892569, Email id: katyayinigona@gmail.com	Member	
8	**Ms. Sharmila Begum** Assistant Professor in Computer Science, A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru, Mobile No: 7794086972, Email id: sharmilabegummohammad123@gmail.com,	Member	

Minutes of the meeting of Board of Studies in P.G. Computer Science for II-year IV Semester, I-year II Semester of M.Sc. (Computer Science) of Adusumilli Gopalakrishnaiah & Sugarcane Growers Siddhartha Degree College of Arts & Science, Vuyyuru, Krishna District held on 05-02-2025 at 03.00 PM in the Department of PG Computer Science through offline / online mode.

AGENDA

1. To discuss and approve the Programme Structure and Syllabi of Fourth Semester of M.Sc. (Computer Science) for the batch of students admitted from the Academic Year 2023-24 (R22) and onwards.
2. To discuss and approve the Programme Structure and Syllabi of Second Semester of M.Sc. (Computer Science) for the batch of students admitted from the Academic Year 2024-25 (R22) and onwards.

PROPOSALS

As per the new regulations recommended by the Krishna University with effect from 2022-2023(R22), new structure is formulated for M.Sc. (Computer Science) Programme. The Program Structure and Syllabi of Fourth & Second Semesters may be approved for the batch of students admitted in the academic year 2023-24 & 2024-25.

1) It is resolved and recommended to continue the same syllabus without having any changes for **IV Semester** of M.Sc. (Computer Science) programme for the Academic year 2024-25 for the following courses:

Course Code	Title of the Course
22CS4T1	Artificial Intelligence
22CS4E1	Cloud Computing
22CS4E3	Big Data Analytics
22CS4E5	Deep Learning
22CS4L1	Big Data Analytics Lab
22CS4E7	Natural Language Processing
22CSMOL401	CHOOSE MOOCS COURSE FROM SWAYAM/NPTEL SOURCES
22CSPW401	PROJECT WORK EVALUATION AND VIVA-VOCE

2) It is resolved and recommended to continue the same syllabus without having any changes for **II Semester** of M.Sc. (Computer Science) programme for the Academic year 2024-25 for the following courses:

Course Code	Title of the Course
22CS2T1	Computer Networks
22CS2T2	Data Structures
22CS2T3	Web Technologies
22PG201	Research Methodology & IPR
22CS2E1	Software Engineering
22CS2L1	Data Structures Lab
22CS2L2	Web Technologies Lab

3) Suggestions

… Chairman

Course Structure

Class : M.Sc. (Computer Science)
Semester : IV

Course Code	Course Title	Teaching Hours		Core / IDC / DSE / SEC / OEC / MOOCS	CIA	SEE	No. of Credits
		Lecture	Practical				
22CS4T1	Artificial Intelligence	4	0	Core	30	70	4
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY THREE)							
22CS4E1	Cloud Computing	4	0	DSE	30	70	4
22CS4E2	Cyber Security	4	0	DSE	30	70	4
22CS4E3	Big Data Analytics	4	0	DSE	30	70	4
22CS4E4	Applied Data Analysis	4	0	DSE	30	70	4
22CS4E5	Deep Learning	4	0	DSE	30	70	4
22CS4E6	Information Security	4	0	DSE	30	70	4
PRACTICALS							
22CS4L1	Big Data Analytics Lab	0	6	Core	30	70	3
ENTREPRENURAL & INNOVATION/IT SKILL RELATED TO SKILL ENHANCEMENT COURSES (CHOOSE ANYONE)							
22CS4E7	Natural Language Processing	3	0	SEC	30	70	3
22CS4E8	Dynamic Web Programming using Python	3	0	SEC	30	70	3
22CS4E9	Business Analytics using Tableau	3	0	SEC	30	70	3
MOOCS	CHOOSE MOOCS FROM SWAYAM/NPTEL SOURCES						4
PROJECT WORK EVALUATION AND VIVA-VOCE					Nil	100	4
TOTAL					**180**	**520**	**30**

Note: Students may be allowed to register and appear for MOOCS from the third semester itself. However, students are to complete the MOOCS successfully and submit pass certificate of the same to the University through the Principal of the College concerned for approval and endorsement of the same on grade cards and PCs and ODs as per the regulations of the University.

Class : M.Sc. (Computer Science)
Semester : II

Course Code	Course Title	Teaching Hours		Core / IDC / DSE / SEC / OEC / MOOCS	CIA	SEE	No. of Credits
		Lecture	Practical				
22CS2T1	Computer Networks	4	0	Core	30	70	4
22CS2T2	Data Structures	4	0	Core	30	70	4
22CS2T3	Web Technologies	4	0	Core	30	70	4
22PG201	Research Methodology & IPR	3	1	SEC	30	70	3
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY ONE)							
22CS2E1	Software Engineering	4	1	DSE	30	70	4
22CS2E2	Mobile Applications	4	1	DSE	30	70	4
22CS2E3	Unix Programming	4	1	DSE	30	70	4
PRACTICALS							
22CS2L1	Data Structures Lab	0	6	Core	30	70	3
22CS2L2	Web Technologies Lab	0	6	Core	30	70	3
TOTAL					**210**	**490**	**25**

Note: At the end of 2nd semester, every student must undergo Summer Internship / Apprenticeship / Project Work / Industrial Training / Research based Project Work for Six Weeks and must prepare a report concerned as per approved project guidelines and submit the same to the University 14 days before the commencement of third semester end examinations.

ARTIFICIAL INTELLIGENCE

Course Code	**:**	**22CS4T1**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Core				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Objectives:

This course will help enable the students to understand and familiar with History, Foundations of AI, Problem Solving, State-Space and Control Strategies, Logic Concepts, Knowledge Representation in Propositional Logic, Expert System and Applications, Fuzzy Sets and Fuzzy Logic.

Specific Objectives include:

- Gain knowledge regarding History, Foundations, and Trends in AI.
- Identify how solve a specific problem and provide the best result using different Search Strategies.
- Learn Logic Concepts utilized in AI.
- Understand Knowledge Representation.
- Laying foundation and learning tools for quantifying, handling, and harnessing uncertainty in applied Machine learning, Fuzzy Logic.

Course Outcomes: On successful completion the students should be able to

CO1	Recall History, Foundations and Logic Concepts of AI
CO2	Summarize the Basic of Knowledge Representation, Fuzzy Sets and Fuzzy Logic, Strategies for State Space Problem Solving and Uncertainty Measurement.
CO3	Identify the Current Trends, Constraint Satisfaction used in AI.
CO4	Analysis Expert Systems, Uncertainty Measurement, and Fuzzy Logic.
CO5	Perceive Methodologies for representing knowledge in AI Applications.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction**: Introduction, History, Intelligent Systems, Foundations of AI, Applications, Tic-Tac-Toe Game Playing, Development of AI Languages, Current trends.	12
II	**Problem Solving State-Space and Control Strategies:** Introduction, General Problem Solving, Characteristics of problem, Exhaustive Searches, Heuristic Search Techniques, Iterative Deepening A*, Constraint Satisfaction.	12
III	**Logic Concepts:** Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Predicate Logic.	12
IV	**Knowledge Representation:** Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.	12
V	**Expert System and Applications:** Introduction Phases in building Expert Systems, Expert System vs Traditional Systems. **Uncertainty Measure:** Probability Theory, Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shaffer Theory. **Fuzzy Sets and Fuzzy Logic**: Introduction, Fuzzy Sets, Fuzzy Set Operations, Types of Membership Functions.	12

Prescribed Textbook			
	Author	Title	Publisher
1	Saroj Kaushik	Artificial Intelligence	Cengage Learning, Second Edition, 2022 ISBN: 9789355730428

Reference Textbooks			
	Author	Title	Publisher
1	Deepak Khemani	Artificial Intelligence	McGraw Hill Education, 2018, Sixth Reprint, ISBN: 9781259029981
2	Patterson	Introduction to Artificial Intelligence and Expert Systems.	PHI, 2015, ISBN: 978-8120307773
3	George F Lugar	Artificial Intelligence structures strategies for Complex Problem Solving	PEA, Fifth Edition ,2004 ISBN: 978-0321263186
4	Stuart Russel, Peter Norvig	Artificial Intelligence, A Modern Approach	PEA, 4th Edition,2022 ISBN:978-9356063570

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : Artificial Intelligence
Course Code : 22CS4T1
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions **(5×4=20 Marks)**

1. (a) Define Artificial Intelligence. Write in short about Tic_Tac_Toe game. (CO1, L1)
(or)
(b) What are the applications of Artificial Intelligence? (CO3, L1)

2. (a) What is Iterative Deepening A*? (CO2, L2)
(or)
(b) What is Constraint Satisfaction? (CO3, L2)

3. (a) What is Axiomatic System? (CO1, L1)
(or)
(b) Compare and Contrast Propositional Logic and Predicate Logic. (CO2, L2)

4. (a) What are different approaches for Knowledge Representation? (CO2, L1)
(or)
(b) What is Extended Semantic Network KR? (CO2, L1)

5. (a) What is Certainty Factor Theory? (CO2, L1)
(or)
(b) What are the operations of Fuzzy Sets? (CO2, L1)

SECTION-B

Answer ALL Questions **(5×10=50 Marks)**

6. (a) Explain History of Artificial Intelligence briefly. (CO1, L1)
(or)
(b) Explain Current Trends in Artificial Intelligence. (CO1, L1)

7. (a) Explain the different characteristics of a problem. (CO2, L5)
(or)
(b) Explain various Heuristic searches used to find a solution. (CO2, L5)

8. (a) Explain Natural Deduction System to prove the validity of an argument. (CO1, L4)
(or)
(b) Explain Semantic Tableau System in Propositional Logic. (CO3, L4)

9. (a) Discuss Knowledge Representation using Semantic Networks. (CO6, L6)
(or)
(b) Elaborate Knowledge Representation using Frames. (CO6, L6)

10. (a) How do you use Bayesian Belief Networks to represent probabilistic relations? (CO4, L2)
(or)
(b) Explain the components of an Expert System. (CO4, L2)

CLOUD COMPUTING

Course Code	**:**	**22CS4E1**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Cloud Computing is a course that illustrates concepts of Cloud Computing and Virtualization, Services and Deployment Models of Cloud Computing, Developing Cloud Applications using Open-Source Cloud Software, AAA Model, Challenges and Benefits of Mobile Cloud Computing.

Course Objectives:
This course will help enable the students to understand and learn various Concepts of Key Technologies, Strengths, and Limitations of Cloud Computing, core issues of Virtualization, Open-Source Architectures, Services of Cloud Computing, and Develop and deploy Cloud Applications using Popular Cloud Platform, Risks, Consequences and Costs of Cloud Computing and Mobile Cloud Computing

Specific Objectives include:
- Articulate the Main Concepts, Key Technologies, Strengths, and Limitations of Cloud Computing and the core issues of Virtualization.
- Understand the Open-Source Architectures and Services of Cloud Computing.
- Develop and deploy Cloud Applications using Popular Cloud Platforms.
- Explore the Risks, Consequences and Costs of Cloud Computing and understand the implementations of AAA Model in the Cloud.
- Introduce the broad perspective of Mobile Cloud Computing.

Course Outcomes: On successful completion the students should be able to

CO1	What is Virtualization and its Benefits, Mechanisms, Server Virtualization versus Cloud Computing.
CO2	Infer about Open-Source Cloud Implementations, Application Architecture for Cloud, AAA Administration for Clouds.
CO3	Analyse Stages during the development process of Cloud Application, Cloud Computing Service Delivery Models.
CO4	Explain about Mobile Cloud Computing, Programming Support for Google Apps Engine, Amazon EC2, Elastic Block Store (ESB).
CO5	Discuss Risks, Consequences and Costs for Cloud Computing, Cloud Computing Services.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Era of Cloud Computing:** Getting to Know the Cloud, Peer-to-Peer, Client-Server and Grid Computing, Cloud Computing versus Client-Server Architecture, Cloud computing versus Peer-To Peer Architecture, Cloud computing versus Grid Computing, how we got to the Cloud, Server Virtualization versus Cloud Computing, Components of Cloud Computing, Cloud Types, Cloud Computing Service Delivery Models. **Introducing Virtualization**: Introducing Virtualization and its Benefits, Implementation Levels of Virtualization, Virtualization at the OS Level, Virtualization Structure, Virtualization	12

	Mechanisms, Open-Source Virtualization Technology, Binary Translation with Full Virtualization, Virtualization of CPU, Memory and I/O Devices, Hardware support for Virtualization in Intex x86 Processor	
II	**Cloud Computing Services:** Infrastructure as a Service, Platform as a Service, Language and Pass, Software as a Service, Database as a Service. **Open-Source Cloud Implementations and Administration:** Open-Source Eucalyptus Cloud Architecture, Open-Source Open Stack Cloud Architecture	12
III	**Application Architecture for Cloud:** Cloud Application Requirements, Recommendations for Cloud Application Architecture, Fundamental Requirements for Cloud Application Architecture, Relevance and use of Client-Server architecture for Cloud Application, Service Oriented Architecture for Cloud Applications. **Cloud Programming:** Programming Support for Google Apps Engine, Big Table as Google's NOSQL System, Chubby as Google Distributed Lock Service, Programming Support for Amazon EC2, Elastic Block Store (ESB).	12
IV	**Risks, Consequences and Costs for Cloud Computing:** Introducing Risks in Cloud Computing, Risk Assessment and Management, Risk of Vendor Lock-In, Risk of Loss Control, Risk of Not Meeting Regulatory Compliances, Risk of Resource Scarcity, Risk in Multi-Tenant Environment, Risk of Failure, Risk of Failure of Supply Chain, Risk of Malware and Internet Attacks, Risk of Inadequate SLA , Risk of Management of Cloud Resources, Risk of Network Outages, Risks in the Physical Infrastructure, Legal Risk due to Legislation, Risks with Software and Application Licensing, Security and Compliance Requirements in a Public Cloud, Direct and Indirect Cloud Costs, Calculating Total Cost of Ownership for Cloud Computing, Cost Allocations in a Cloud. **AAA Administration for Clouds:** The AAA Model, Single Sign-On for Clouds, Industry Implementations for AAA, Authentication Management in the Cloud, Authorization Management in the Cloud.	12
V	**Application Development for Cloud:** Developing On-Premise Versus Cloud Applications, Modifying Traditional Applications for Deployment in Cloud, Stages during the development process of Cloud Application, managing a Cloud Application, Using Agile Software Development for Cloud Application, Cloud Applications: What Not to do, Static Code Analysis for Cloud Applications, Developing Synchronous and Asynchronous Cloud Applications. **Mobile Cloud Computing:** Definition of Mobile Cloud Computing, Architecture of Mobile Cloud Computing, Benefits of Mobile Cloud Computing, Mobile Cloud Computing Challenges.	12

Prescribed Textbooks			
	Author	Title	Publisher
1	Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde & Dr. Deven Shah	Cloud Computing, Black Book	Dream Tech Press

Reference Textbooks			
	Author	Title	Publisher
1	Thomas Erl, Zaigham Mahmood, Ricardo Puttini	Cloud Computing Concepts Technology and Architecture	Pearson
2	Raj Kumar Buyya, Christen Vecctiola, S Tammaraiselvi	Mastering Cloud Computing, Foundations and Application Programming	TMH

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f admitted batch 2022-23)

Course Name : Cloud Computing
Course Code : 22CS4E1
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions **(5×4=20 Marks)**

1. (a) Explain SaaS (CO6, L2)
   (or)
   (b) Explain Virtualization (CO1, L2)

2. (a) What is an Open Source? (CO2, L1)
   (or)
   (b) What is Eucalyptus? (CO2, L1)

3. (a) What are the advantages of SOA? (CO2, L1)
   (or)
   (b) What are the drawbacks of GFS? (CO5, L1)

4. (a) Explain the risk of Malware (CO6, L5)
   (or)
   (b) Explain Authentication (CO2, L5)

5. (a) What not to do in Cloud Application Development? (CO4, L1)
   (or)
   (b) What are the advantages of MCC? (CO5, L1)

SECTION-B

Answer ALL Questions **(5×10=50 Marks)**

6. (a) Explain the various Types of Cloud with neat diagrams. (CO4, L2)
   (b) Compare and contrast Cloud Computing Architecture with Peer-to-Peer Architecture. (CO1, L2)
   (or)
   (c) Explain Virtualization and its benefits and levels. (CO1, L2)

7. (a) Discuss Cloud Computing Services on private cloud. (CO6, L6)
   (or)
   (b) Design Open-Source Cloud Architecture with example. (CO2, L6)

8. (a) What are the requirements of Cloud Application? (CO2, L1)
   (or)
   (b) What is Big Table as Google's NoSQL System? Explain EBS. (CO5, L1)

9. (a) Explain Risks in Cloud Computing. (CO6, L5)
   (or)
   (b) Explain AAA Model for Clouds. (CO2, L5)

10 (a) Explain Stages during the Development Process of Cloud Applications. (CO4, L5)
   (or)
   (b) Explain Mobile Cloud Computing its Advantages and Disadvantages. (CO5, L5)

CYBER SECURITY

Course Code	**:**	**22CS4E2**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose: To understand the field of computer security, threats, hardening systems, securing networks, cryptography and organizational security policies and how to protect computer operating systems, networks, and data from cyber-attacks and how to monitor systems and mitigate threats when they happen.

Course Objective:
Course aim is to equip students with the technical knowledge and skills needed to protect and defend computer systems and networks. To develop graduates that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information technology assets.

Specific Objectives include:
- To understand the concepts of Computer and Network Security, Classical Encryption Techniques and Advanced Encryption Standard.
- To know Public Key Cryptography and RSA, Key Management, Message Authentication Codes.
- To be aware of Cyber Crimes & Cyber offenses.
- To implement Mobile & Wireless Devices, Tools and Methods used in Cyber Crime.
- To know Forensics of Handheld Devices and Case Studies of Cyber Crimes.

Course Outcomes: On successful completion the students should be able to

CO1	Recall the concepts of Computer and Network Security.
CO2	Demonstrate the Classical Encryption Techniques, application of Public Key Cryptography, RSA, and Message Authentication Codes, AES, Key Management, financial frauds.
CO3	Plan an introduction to Cybercrime and criminals, Cyber offenses.
CO4	Analyse Cyber offenses**,** mobile and wireless devices, along with tools and methods used in Cybercrime.
CO5	Perceive cybercrime handheld device forensics in Cybercrime, using illustrations, examples, and mini cases.

Unit No	Detailed syllabus	Lecture Hours
I	**Computer and Network Security Concepts:** Computer Security Concepts-The OSI Security Architecture-Security Attacks- Security Services- Security Mechanisms- A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model- Substitution Techniques-Transposition Techniques-Rotor Machines - Steganography. **Advanced Encryption Standard:** AES Structure -AES Transformation Functions -AES Key Expansion-An AES Example.	12
II	**Public Key Cryptography and RSA:** Principles of Public Key Crypto Systems-The RSA Algorithm. **Key Management:** Other Public Key Crypto Systems: Diffie Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography. **Message Authentication Codes:** Authentication Requirements-Authentication Functions-Message Authentication Codes.	12

III	**Introduction to Cybercrime:** Introduction - Cybercrime: Definition and Origins of the Word -Cybercrime and Information Security - Who are Cybercriminals? - Classifications of Cybercrimes - Cybercrime: The Legal Perspectives - Cybercrimes: An Indian Perspective - Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes- Cybercrime Era: Survival Mantra for the Netizens-Concluding Remarks and Way Forward to Further Chapters. **Cyber offenses: How Criminals Plan Them:** Introduction- How Criminals Plan the Attacks-Social Engineering -Cybers talking -Cyber Cafe and Cybercrimes -Botnets: The Fuel for Cybercrime – Attack Vector- Cloud Computing	12
IV	**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 - Organizational Measures for Handling Mobile-Organizational Security Policies and Measures in Mobile Computing Era-Laptops. **Tools and Methods Used in Cybercrime:** Introduction -Proxy Servers and Anonymizers - Phishing -Password Cracking - Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors -Steganography -DoS and DDoS Attacks - SQL Injection- Buffer Overflow-Attacks on Wireless Networks.	12
V	**Forensics of Handheld Devices:** Introduction - Understanding Cell Phone Working Characteristics -Hand Held Devices and Digital Forensics - Toolkits for Hand-Held Device Forensics - Hunting threats with Pandas - MFT Analysis -Extracting Feature Vectors from URL Strings for Malicious URL Detection -Monitor Active SSH Sessions With Prometheus and Grafana. **Cybercrime: Illustrations, Examples and Mini Cases:** Introduction - Real Life Examples - Mini Cases -Illustrations of Financial Frauds in Cyber Domain - Digital Signature - Related Crime Scenarios - Digital Forensics Case Illustrations- Online Scams.	12

Prescribed Textbook			
	Author	Title	Publisher
1	William Stallings	Cryptography and Network Security	Pearson, Seventh Edition, 2017
2	Nina Godbole, Sunit Belapur	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Wiley India Publications, Second Edition April, 2011
Reference Textbook			
	Author	Title	Publisher
1	William Stallings	Network Security Essentials-Applications and Standards	Pearson Education (2007), Third Edition.
2	Chris McNabb	Network Security Assessment	O'Reilly (2007),2nd Edition
3	Jon Erickson	Hacking-The Art of Exploitation	Press (2006), SPD
4	Neal Krawety	Introduction to Network Security	Thomson (2007)
5	Ankit Fadia	Network Security-A Hackers Perspective	Macmillan (2008)

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f admitted batch 2022-23)

Course Name : Cyber Security
Course Code : 22CS4E2
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions **(5×4=20 Marks)**

1. (a) Explain Security Attacks and its types (CO1, L2)
(or)
(b) Explain Steganography (CO1, L2)

2. (a) What is Encryption and Decryption? (CO2, L1)
(or)
(b) What is Cryptology? (CO2, L1)

3. (a) What are Authentication Requirements? (CO2, L1)
(or)
(b) What phishing and its working? (CO3, L1)

4. (a) Explain Keyloggers and its types (CO4, L2)
(or)
(b) Explain Cybercrime and who are cyber criminals (CO3, L2)

5. (a) What is Botnet? (CO5, L1)
(or)
(b) What is Cyber Terrorism? (CO5, L1)

SECTION-B

Answer ALL Questions **(5×10=50 Marks)**

6. (a) Explain Model for Network Security in detail with neat Diagram. (CO1, L2)
(b) Explain Transposition and Rotor Machine Technique in detail with example. (CO1, L2)
(or)
(c) Explain AES Cipher Encryption in detail. (CO2, L2)

7. (a) Apply RSA Algorithm for message authentication. (CO2, L3)
(or)
(b) Build Diffie Hellman Key Exchange with example. (CO2, L3)

8. (a) What are different ways of password cracking? (CO4, L1)
(or)
(b) What is SQL injection and what are the preventive measures from attack? (CO4, L1)

9. (a) Explain Monitor Active SSH Sessions with Prometheus and Grafana. (CO4, L2)
(or)
(b) Explain Hunting threats with pandas. (CO5, L2)

10 (a) Plan the counter measures to be practiced for possible attacks on mobile/cell phones. (CO5, L5)
(or)
(b) Discuss how Keylogger be used to commit a cybercrime. (CO4, L5)
(c) Discuss DoS and DDoS in detail. (CO4, L5)

BIG DATA AND ANALYTICS

Course Code	**:**	**22CS4E3**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Descriptive and Purpose:
This course is designed to assist students in comprehending the significance of big data in everyday life. It covers topics such as data storage and processing using Hadoop, gaining knowledge about contemporary database systems, utilizing Tableau for data visualization, and implementing Apache Spark through APIs, including SQL and Data Frames, for efficient data processing and analysis.

Course Objectives:
The course helps the students to understand Big data and its role in Daily Life, Data Storage and Processing in Hadoop, Knowledge acquisition on Modern Databases, Visualization of Data with Tableau, Implementation of Apache Spark with API- SQL and Data Frames.

Specific objectives include:
1. To understand bigdata and its role in Daily Life.
2. To know How data is Stored and Processed in Hadoop.
3. To acquire knowledge on Modern Databases working with MongoDB.
4. To implement Apache pig and Hive
5. To implement Apache Spark with API- SQL and Data Frames.

Course Outcomes: On Successful completion the student will be able to:

CO1	What is Big Data, Big Data Analytics, MongoDB, Underneath an RDD, Changing in the realms of Big Data.
CO2	Infer about Apache Spark, Spark SQL and Data Frames, Operations, Typical Data Warehouse and Hadoop Environment
CO3	Analyse Hive Architecture, Processing Data with Hadoop, MongoDB Query Language.
CO4	Explain Hadoop Overview, Hadoop Distributed File System, Map Reduce Programming.
CO5	Discuss Top Challenges facing Big Data, Data Types in MongoDB, Anatomy of Pig, Types of NoSQL Databases, Structuring Spark.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Types of Digital Data:** Classification of Digital Data. Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data? – Other Characteristics of Data – Why Big Data? – Traditional Business Intelligence versus Big Data – Typical Data Warehouse Environment – Typical Hadoop Environment – Coexistence of Big Data and Data Warehouse – What is Changing in the realms of Big Data. **Big Data Analytics:** What is Big Data Analytics – What Big Data Analytics is not? – Why this sudden Hype around Big Data Analytics? – Classification of Analytics – Greatest Challenges that Prevent Business from Capitalizing Big Data – Top Challenges facing Big Data – Why Big Data Analytics Important? – What Kind of Technologies are we looking toward to help meet	12

	the challenges posed by Big Data? – Data Science – Data Scientist – Terminologies used in Big Data Environments.	
II	**Hadoop:** Features of Hadoop – Key advantages of Hadoop – Versions of Hadoop – Overview of Hadoop Ecosystem – Hadoop Distributions – Why Hadoop? – Why not RDBMS – RDBMS versus Hadoop – Distribution Computing Challenges – History of Hadoop – Hadoop Overview – Hadoop Distributed File System. **Processing Data with Hadoop:** Managing Resource and Applications with Hadoop with YARN (Yet Another Recourse Negotiator) – Interacting with Hadoop Ecosystem.	12
III	**Introduction to Map Reduce Programming:** Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression. **NoSQL:** Where is it used? – What is it? – Types of NoSQL Databases – Why NoSQL? – Advantages of NoSQL – What we miss with NoSQL? – Use of NoSQL in Industry – SQL versus NoSQL **MongoDB:** What is MongoDB, Why MongoDB, Using JavaScript, Script Object Notation, Generating Unique Key, Support for Dynamic Queries, Storing Binary Data, Replication, Sharding, Updating Information in Place, Terms used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language?	12
IV	**Hadoop Eco System: Hive:** What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) – RC File Implementation – User Defined Function. **PIG:** What is PIG? - Anatomy of Pig – Pig on Hadoop – Pig Philosophy – Use Case for Pig – Pig Latin – Data type in Pig – Running Pig – Execution Mode of Pig – HDFS Commands – Relational Operators – Eval Function – Complex Data Types – User Defined Functions – Parameter Substitution. HBase: Basics – Concepts – Clients – HBase versus RDBMS.	12
V	**Apache Spark: Introduction to Apache Spark:** A Unified Analytics – What Is Apache Spark? Unified Analytics – The Developer's Experience – Using Scala and PySpark Shell – Understanding Spark Application Concepts – Transformations – Actions and Lazy Evaluation – The Spark UI. **Apache Spark's API:** What's Underneath an RDD? – Structuring Spark – The Data Frame API – The Dataset API – Data Frames Versus Datasets – When to Use RDDs – Spark SQL and the Underlying Engine. **Spark SQL and Data Frames:** Introduction to build in Data Sources – Using Spark SQL in Spark Applications – SQL Tables and Views – Data Sources for Data Frames and SQL Tables: Data Frame Reader – Data Frame Writer – JSON – CSV- Images – Binary Files. **Common Data Frames and Spark SQL Operations:** Unions – Joins – Windowing Spark SQL and Datasets: Working with Datasets: Creating Sample Data – Transforming Sample Data.	12

Prescribed Textbooks			
S. No	Author	Title	Publisher
1	Seema Acharya-Subhashini Chellappan	Big Data and Analytics	Wiley Publications – Second Edition (UNIT I, II, III, IV)
2	Karau H, Konwinski A, Wendell P, Zaharia M	Learning Spark: Lightning-Fast Data Analytics	O'Reilly Second Edition (UNIT V: 1 to 6 Chapters)

Reference Textbooks			
S. No	Author	Title	Publisher
1	Tom White	Hadoop: The Definitive Guide	O'Reilly, Yahoo Press, Third Edition
2	Bill Chambers & Matei Zaharia	SPARK: The Definitive Guide	O'Reilly, 2018 Edition
3	Guller M	Big data Analytics with Spark: A Practitioner's Guide to using Spark for Large Scale Data Analysis	A press, 2015

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f admitted batch 2022-23)

Course Name : BIG DATA AND ANALYTICS
Course Code : 22CS4E3
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions **(5×4=20Marks)**

1. (a) Function Big Data. (CO1, L4)
(or)
(b) Classify the analytics. (CO1, L4)

2. (a) Compare RDBMS and Hadoop. (CO5, L2)
(or)
(b) List the Key Components of Yarn? (CO4, L4)

3. (a) What is Hadoop Map Reduce? (CO5, L1)
(or)
(b) List the types of NoSQL Databases. (CO6, L4)

4. (a) Explain various Data Types for Hive. (CO4, L5)
(or)
(b) Compare HBase versus RDBMS (CO6, L5)

5. (a) What is Apache Spark? (CO2, L1)
(or)
(b) Define JSON. (CO2, L1)

SECTION-B

Answer ALL questions **(5×10=50 Marks)**

6. (a) Explain the Digital Data with examples. (CO1, L2) 5 Marks
(b) Summarize the challenges faced by Bigdata. (CO6, L2) 5 Marks
(or)
(c) Explain Brewers Theorem with examples. (CO1, L2) 5 Marks
(d) Explain the In-memory Analytics. (CO1, L2) 5 Marks

7. (a) Explain Hadoop Eco System with neat diagram. (CO5, L2) 10 Marks
(or)
(b) Explain HDFS File Systems with neat diagram. (CO5, L2) 10 Marks

8. (a) Make use of Map Reduce in Hadoop with example. (CO5, L3) 10 Marks
(or)
(b) Make use of File Read and File Write in Hadoop. (CO5, L3) 10 Marks

9. (a) Explain Hive Architecture with neat diagram. (CO4, L5) 10 Marks
(or)
(b) Explain CRUD Operations in MongoDB with examples. (CO4, L5) 5 Marks
(c) Explain MongoDB import and export with examples. (CO4, L5) 5 Marks

10. (a) Explain TDD in Apache Spark with examples. (CO1, L5) 10 Marks
(or)
(b) Explain Common Data Frames and Distinguish between Data Frames Vs Datasets. (CO5, L5) 5 Marks
(c) Explain Spark SQL Operations in spark. (CO2, L5) 5 Marks

APPLIED DATA ANALYSIS

Course Code	**:**	**22CS4E4**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Applied Data Analysis is a course that illustrates concepts of R-Programming, Data Structures, Descriptive Statistical Analysis, Basic Graphs, Analysis of ANOVA, Multivariate Analysis, Files & Databases.

Course Objectives:
This course will help enable the students to understand and familiar with R-Programming, Data Structures, Descriptive Statistical Analysis, Basic Graphs, Analysis of ANOVA, Multivariate Analysis, Files & Databases.

Specific Objectives include:
- Master R-programming and data structures for effective data manipulation.
- Conduct descriptive statistical analysis to summarize and interpret datasets.
- Generate basic graphs using R for visual data representation.
- Apply ANOVA for in-depth analysis of variance within datasets.
- Learn to handle files and databases to effectively manage and retrieve data.

Course Outcomes: On successful completion of this course, the students able to:

CO1	How to use R environment, R packages, Data Types and control Flow Statements.
CO2	Explain basic implementation techniques in R, including regression and time series analysis
CO3	Apply Descriptive statistics and hypothesis tests in R including parametric and non-parametric tests.
CO4	analyse variance within datasets using various ANOVA models
CO5	Create and interpret Basic, and Advanced Graphs, Database connection using MYSQL in R

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction to R:** Why use R? R Environment, Working with R Packages, Understanding Datasets, Data Types, Data Structures (Operations on Data Structures), Missing Values, Sorting Data, Merging Datasets, Subsetting Datasets, Control Flow Statements, Aggregation and Restructurings.	12
II	**Descriptive Statistics:** Introduction to Descriptive Statistics (Measures of Central Tendency, Measures of Dispersion of Variability, Measures of Shapes (Skewness and Kurtosis)), Introduction to Sampling(Sampling Types), Hypothesis Testing with R(One Sample Test, One Sample Sign Test, Two Samples Test), Parametric Test(Correlations, Z-Test, T-Test), Non Parametric Tests (Wilcoxon Signed- Rank Test, Chi Square Test).	12
III	**Basic Graphs:** Bar Plots, Pie Charts, Histograms, Line, Dot Plots, Kernel Density Plots and Dot Plots. The Advanced Graphics: The ggplot2 Package. **Analysis of Variance:** Fitting ANOVA Models, One-way ANOVA, One-way ANCOVA,	12

	Two-way factorial ANOVA, Repeated measures ANOVA, Multivariate Analysis of Variance (MANOVA)	
IV	**Basic Multivariate Analysis:** Regression (Simple Linear Regression, Multiple Linear Regression, Logistic Regression), Time Series Analysis (Creating Time Series, Components of Time Series Analysis, Seasonal Decomposition, Exponential Models), Forecasting (Simple Moving Averages, Weighted Moving Averages, Single Exponential Smoothing)	12
V	**Connecting R to External Interfaces:** CSV Files (Reading From a CSV File, Writing to a CSV File), Microsoft Excel (Reading from XLSX File, Writing to XLSX File), Databases (Connecting R to MYSQL ,Creating Tables, Inserting Rows, Updating Rows, Deleting Rows, Querying Rows, Querying Tables, Dropping Tables), XML Files (Reading From XML Files, JSON Files, Reading From JSON Files), Binary Files (Writing to Binary Files, Reading From Binary Files).	12

Prescribed Textbook			
	Author	Title	Publisher
1	Dr. Rob Kabacoff	R in Action: Data Analysis and Graphics with R. [UNIT-I, UNIT-II, UNIT-III]	Manning Publications Co, Edition 2011.
2	Dr. Jeeva Jose	A Beginners Guide for Data Analysis Using R Programming. (UNIT IV and UNIT V), UNIT IV: Chapter 11 11.3 [11.3.1 to 11.3.3] 11.5,11.6 [11.6.1 to 11.6.3], UNIT V: Chapter 6 [6.1 to 6.6]	Khanna Book Publishing Co. (P) Ltd, Edition 2019.

Reference Textbooks			
	Author	Title	Publisher
1	Dr. Dhaval Maheta	Data Analysis using R	Notion Press, September 2021
2	Michael J. Crawley	The R Book	Wiley, Edition: 2007
3	Ken Black John	Business Statistics for Contemporary Decision Making	Wiley & Sons, Inc., Edition 2013

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f admitted batch 2022-23)

Course Name : Applied Data Analysis
Course Code : 22CS4E4
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions **(5×4=20 Marks)**

1. (a)What are the different Data Types used in R. (CO1, L1)
(or)
(b) Define Subsetting and Merging. (CO1, L1)
2. (a) How to remove missing values in R? (CO1, L1)
(or)
(b) What is meant by Random Sampling and Non-Random Sampling? (CO3, L1)
3. (a) What is Correlation? Explain its types (CO3, L1)
(or)
(b) What is meant by t-test and f-test? Give one example using R (CO3, L1)
4. (a) What is the purpose of ANOVA? (CO4, L1)
(or)
(b) Define Logistic Regression. Give one example using R. (CO2, L1)
5. (a) Define Time Series Analysis and its components. (CO2, L1)
(or)
(b) What is the syntax used to readXML Files. (CO6, L1)

SECTION-B

Answer ALL questions **(5×10=50 Marks)**

6. (a)Outline the different Data Structures used in R. (CO1, L2)
(or)
(b) Explain Control Flow Statements in R. (CO1, L2)
7. (a) Explain the different statistical measures used in Descriptive Statistics. (CO3, L5)
(or)
(b) Explain Non-Parametric Test and Wilcoxon Signed-Rank Test in R (CO3, L5)
8. (a) List Various Types of Charts in R. (CO6, L4)
(or)
(b) Analyse One-way ANOVA and Two-way factorial ANOVA. (CO4, L4)
9. (a) Distinguish Simple and Multiple Regression in R with Example. (CO2, L4)
(or)
(b) Classify various components used in Time Series Analysis in R with example. (CO3, L4)

10.(a) Explain procedure to connect to a database in R using MYSQL with an example. (CO6, L5)
(or)
(b) Explain procedure to import .csv file and binary file in R with an example. (CO6, L5)

DEEP LEARNING

Course Code	:	**22CS4E5**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Descriptive and Purpose: This course is intended to facilitate students' comprehension of several key aspects of deep learning. It covers introduction of Deep Learning and focuses on the practical implementations of Artificial Neural Networks, Tensor Flow and Keras, CNN and RNN.

Course Objectives: The course helps the students to understand Basics of Deep Learning, CNN and RNN Neural Networks in Tensor Flow, Applications of Deep Learning.

Specific objectives include:
- To gain familiarity in Basics of Deep Learning.
- To apply the Activation functions and Loss functions on Neural Networks.
- To develop neural networks using APIs.
- To analyse CNN architectures
- To understand the RNN.

Course Outcomes: On successful completion of this course, the students able to:

CO1	Define Deep Learning, Input Output Layers in Neural Networks and Artificial Neural Networks.
CO2	Demonstrate Feed Forward, Back Propagation, Data Representation for Neural Networks.
CO3	Build Models using TensorFlow & Keras, Artificial Neural Networks, Convolution Neural Networks
CO4	Inspect Loss Functions, Optimizers, Architecture of CNN, LSTM and GRU Layers
CO5	Explain Updating Weights & Biases, Classification, Localization and Recurrent Neural Networks

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction to Deep Learning:** Deep Learning Vs Machine Learning, Inspiration of Neural Network from Brain, The Perceptron: The Simple Idea Behind Neural Networks, Artificial Neuron and its Architecture, Input and Output Layers in Neural Networks, Activation Functions, Loss Functions, Optimizers, Data Representation for Neural Networks, The Gears of Neural Networks.	12
II	**Artificial Neural Networks:** Architecture, Input and Output Layers in Neural Networks, Activation Functions, Loss Functions, Optimizers, Training a Neural Net. Feed Forward Mechanism, Back Propagation in Neural Networks, Gradient Descent Algorithm, Updating Weights and Biases, Vanishing/Exploding Gradients Problems, Reusing Pre-Trained Layers, Faster Optimizers.	12
III	**Introduction to TensorFlow and Keras:** Building ANN with Keras, Problems of Vanishing Gradient and Exploding Gradient, Modifications to Neural Networks, Regularization, Normalization, Dropouts. Hand Digit Recognition in Keras, Regression with Neural Networks, Classification with Neural Networks, Building Image Classifier Using Sequential API, Building Regression MLP using Sequential API, Building Complex Models using Sequential API, Building Dynamic Models using Sequential API, Virtualizing using Tensor Board.	12

IV	**Convolution Neural Networks (CNN):** Meaning of Convolution. Architecture of CNN. Filters, Padding, Data Pre-processing in CNN, Alex net, Google net, LeNet-5, VGGNet, ResNet, Xception, SENet, Image Classification with CNN using Keras, Transfer Leaning in CNN, Using Pre-Trained Models from Keras, Pre Trained Models for Transfer Learning, Classification and Localization.	12
V	**Recurrent Neural Networks (RNN):** A Recurrent layer in Keras, Understanding the LSTM and GRU Layers, A LSTM example in Keras, A Temperature Forecasting Problem, Preparing the Data, First Recurrent Baseline, Using Recurrent Dropout to Fight Over Fitting, Stacking Recurrent layers, Using Bidirectional RNN's.	12

Prescribed Textbook			
	Author	Title	Publisher
1	François Chollet	Deep Learning with Python	Second Edition Paperback-Manning,2017
2	Aurelien Geron	Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems	O'Reilly, 2nd Edition, 2019

Reference Textbook			
	Author	Title	Publisher
1	Peter Bruce	Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python	O'Reilly

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : Deep Learning
Course Code : 22CS4E5
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions **(5×4=20 Marks)**

1. (a) What are the differences between Deep Leaning and Machine Learning? (CO1, L1)
(or)
(b) Write short notes idea behind Neural Networks. (CO1, L1)
2. (a) What are input and output layers? (CO1, L1)
(or)
(b) What is Loss Function? (CO4, L1)
3. (a) What is Vanishing Gradient? (CO4, L1)
(or)
(b) What are modifications to Neural Networks? (CO3, L1)
4. (a) State and explain Convolution. (CO3, L1)
(or)
(b) What is padding? (CO3, L1)
5. (a) What is Recurrent Layer? (CO5, L1)
(or)
(b) How Preparing Data is to be done? (CO5, L1)

SECTION-B

Answer ALL questions **(5×10=50 Marks)**

6. (a) Explain Artificial Neuron and its Architecture. (CO1, L2)
(or)
(b) Explain Data Representation for Neural Networks. (CO2, L2)

7. (a) Explain Gradient Descent Algorithm. (CO4, L2)
(or)
(b) Illustrate Faster Optimizers. (CO4, L2)
8. (a) Explain Building Image Classifier using Sequential API. (CO3, L3)
(or)
(b) Explain Back propagation in Neural Networks. (CO2, L3)

9. (a) Explain Image Classification with CNN using KERAS (CO3, L2)
(or)
(b) Explain the need of Classification and Localization. (CO5, L2)

10. (a) Discuss Temperature Forecasting Problem. (CO5, L6)
(or)
(b) Discuss using Recurrent Dropout to Fight Over Fitting. (CO5, L6)

INFORMATION SECURITY

Course Code	**:**	**22CS4E6**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
The course is intended to understand and gain knowledge on Computer& Network Security, Conventional cryptography Techniques, Digital Signatures, Key Management and Distribution and User Authentication and IP Security and Intruders and Firewalls.

Course Objective:
The course aims to provide a comprehensive understanding of computer and network security, covering cryptography related symmetric and asymmetric techniques, digital signatures, key management, and user authentication to secure digital communication and defend against cyber threats.

Specific Objectives include:
- Understand network security threats, security services and vulnerabilities and countermeasures.
- Understand the symmetric and asymmetric techniques for network security.
- Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.
- Understand the trade-offs and criteria/concerns for security counter measure development.
- Apply methods for authentication, access control, intrusion detection and prevention and mitigate software security vulnerabilities in existing systems.

Course Outcomes:

CO1	Recall Information Security, Conventional, Symmetric and Asymmetric Cryptography.
CO2	Infer Authentication and Digital Signatures and Program Security
CO3	Illustrate Kerberos, Vulnerability, Errors and Viruses.
CO4	Evaluate program security, Honeypots, Personal Firewalls and IDS.
CO5	Identify Security in Networks, Design and Types of Firewalls and Secure Hash function.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction to Information Security:** Attacks, Vulnerability, Security Goals, Security Services and mechanisms. **Conventional Cryptographic Techniques:** Conventional substitution and transposition ciphers, One-time Pad	12
II	**Conventional Cryptographic Techniques:** Block cipher and Stream Cipher, Steganography. **Symmetric and Asymmetric Cryptographic Techniques:** DES, AES, RSA algorithms	12
III	**Authentication and Digital Signatures:** Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos	12
IV	**Program Security:** Non malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels.	12

V	**Security in Networks:** Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME	12

Reference Textbooks			
	Author	Title	Publisher
1	Charles P. Pfleeger	Security in Computing	Fourth Edition, Pearson Education
2	William Stallings	Cryptography And Network Security Principles and Practice	Pearson Education, Fourth Edition.
3	William Stallings	Cryptography And Network Security Principles and Practice	Pearson Education, Fifth Edition.
4	Wenbo Mao	Modern Cryptography: Theory and Practice	Prentice Hall
5	William Stallings	Network Security Essentials: Applications and Standards	Prentice Hall

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : Information Security
Course Code : 22CS4E6
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions **(5×4=20 Marks)**

1. (a) Explain security Goals. (CO1, L2)
(or)
(b) Explain One Time Pad with an example. (CO1, L2)
2. (a) What is Steganography? Explain. (CO1, L1)
(or)
(b) Explain RSA Algorithm. (CO1, L1)
3. (a) What is Digital Signatures? (CO2, L1)
(or)
(b) List secure hash function. (CO5, L1)
4. (a) Explain Trapdoors. (CO4, L2)
(or)
(b) Explain Time-of-check to Time-of- use Errors. (CO3, L2)
5. (a) Explain Access Controls. (CO2, L2)
(or)
(b) Explain Firewall Characteristics? (CO4, L2)

SECTION-B

Answer ALL questions **(5×10=50 Marks)**

6. (a) Explain various Security Attacks and Security Services. (CO1, L2)
(or)
(b) Explain Substitution Techniques. (CO1, L2)
7. (a) Illustrate Block Ciphers. (CO1, L2)
(or)
(b) Explain AES Algorithm. (CO1, L2)
8. (a) Explain Key Management. (CO2, L5)
(or)
(b) Explain Kerberos in detail. (CO3, L5)
9. (a) Explain Buffer Overflow (CO2, L5)
(or)
(b) Illustrate Man-in-the- middle attacks. (CO5, L5)
10. (a) Discuss Honeypots. (CO4, L6)
(or)
(b) Discuss Various Types of Firewalls. (CO5, L6)

BIG DATA AND ANALYTICS LAB

Course Code	**:**	**22CS4L1**	No. Of Practical Hours per week		:	6
Year of Introduction	:	2022-23	Total No. Of Practical Hours		:	90
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
This laboratory course focuses on hands-on experience with Hadoop installations and commands, implementing word count in Hadoop, Pig installations and commands, MongoDB tasks and operations, including bulk documents, arrays, and MapReduce, as well as Spark installation and operations, including RDDs, data frames, and Spark SQL.

Course Objectives:
This laboratory course aimed to implement Hadoop Installations, Hadoop Commands, Word Count in Hadoop, Pig Installation, Pig Commands, MongoDB, MongoDB Commands, Tasks on MongoDB, Bulk Documents in MongoDB, Arrays in MongoDB, Map Reduce in MongoDB, Aggregate Functions in MongoDB, Mongo Import & Export and Spark Installation, Operations of RDD, Working with Data Frames, Spark SQL Operations.

Specific objectives include:
1. To implement Hadoop Installations, Hadoop commands, Word Count in Hadoop.
2. To implement Pig Installation, Pig Commands, MongoDB.
3. To implement MongoDB Commands, Tasks on MongoDB, Bulk Documents in MongoDB, Arrays in MongoDB.
4. To implement MapReduce in MongoDB, Aggregate Functions in MongoDB, Mongo Import & Export.
5. To implement Spark Installation, Operations of RDD, Working with Data Frames, Spark SQL Operations.

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

CO1	Demonstrate foundational Hadoop installations, basic Hadoop commands and implement the Word Count program.
CO2	Illustrating a proficiency in setting up Pig for data processing.
CO3	Understanding of arrays in MongoDB, explaining their basic use and functionality.
CO4	Design and implement advanced tasks in MongoDB
CO5	Apply Spark SQL operations.

Lab Cycle:
1. Hadoop Installation Steps. (CO1, L3)
2. Hadoop Commands. (CO1, L3)
3. Word Count Program in Hadoop. (CO2, L1)
4. Pig Installation Steps. (CO2, L3)
5. Pig Commands. (CO3, L3)
6. Introduction To MongoDB. (CO3, BTL1)
7. MongoDB Commands. (CO3, BTL3)
8. Tasks on MongoDB. (CO4, BTL3)
9. Creating Bulk Documents in MongoDB. (CO4, L6)
10. Arrays in MongoDB. (CO3, L1)

11. Map Reduce in MongoDB. (CO4, L3)
12. Aggregate Functions in MongoDB. (CO4, L3)
13. Mongo Import. (CO4, L3)
14. Mongo Export. (CO4, L3)
15. Spark Installation. (CO5, L3)
16. Operations of RDD. (CO5, L3)
17. Working With Data Frames. (CO5, L3)
18. Spark SQL Operations. (CO5, L3)

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

NATURAL LANGUAGE PROCESSING

Course Code	**:**	**22CS4E7**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Skill Enhancement Course				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Natural Language Processing is a course that illustrates concepts of Understanding the Structure of a Sentences, Pre-processing, Feature Engineering and NLP Algorithms, Basic Feature Extraction Methods, Text Classifier, Text Summarization and Text Generation, Vector Representation.

.

Course Objectives:
This course will help enable the students to understand and familiar with Understanding the Structure of a Sentences, Pre-processing, Feature Engineering and NLP Algorithms, Basic Feature Extraction Methods, Text classifier, Text Summarization and Text Generation, Vector Representation.

Specific Objectives include:

- Gain a comprehensive understanding of the linguistic elements and syntactic structure of sentences.
- Develop proficiency in text preprocessing techniques to clean and prepare raw text data for analysis.
- Learn and apply fundamental feature extraction methods in NLP.
- Acquire proficiency in word and document vectorization for enhanced sentiment analysis.
- Acquire skills in web scraping and API usage to collect text data from online sources and explore text generation methods.

Course Outcomes: On successful completion students should be able to

CO1	Define Natural Language, NLP techniques, components of NLP to process basic text analytics.
CO2	Illustrate feature engineering strategies, Feature Extraction Methods for text data in Python.
CO3	Develop text summarization and generation models using NLP algorithms.
CO4	Analyse web scraping, data collection, and vector representation for text retrieval.
CO5	Evaluate sentiment analysis techniques and tools for text data interpretation

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction:** Understanding natural language processing- What is Natural Language?, What is Natural Language Processing**?,** Understanding basic application**s**-Understanding advanced applications, Advantages of togetherness NLP and Python, Text Analytics and NLP - Basic Text Analytics ,Various steps in NLP-Tokenization, PoS Tagging Removal, Normalization, Spelling, Stemming, Lemmatization, NER, Word Sense Disambiguation, Sentence Boundary Detection	12
II	**Understanding the Structure of a Sentences:** Understanding the components of NLP-NLU and NLG, Differences of NLU and NLG, branches of NLP, what is context-free grammar? Morphological analysis, Lexical analysis, Syntactic analysis, Semantic analysis. **Pre-processing: -**Basic pre-processing, Regular expressions, Basic level regular expression -Basic flags, Advanced level regular expression-Positive look ahead, Positive look behind, Negative look ahead Negative look behind.	12

	Feature Engineering and NLP Algorithms: What is feature engineering? What is the purpose of feature engineering? Basic feature of NLP -Parsers and parsing, Understanding the basics of parsers, Understanding the concept of parsing, developing a parser from scratch- Types of grammar -Context-free grammar, Probabilistic context-free grammar -Calculating the probability of a tree, Calculating the probability of a string	
III	**Basic Feature Extraction Methods**: Introduction, Types of Data- Categorizing Data Based on Structure, Categorization of Data Based on Content, Cleaning Text Data- Tokenization, Types of Tokenizers, Issues with Tokenization, Stemming, RegExp Stemmer, The Porter Stemmer, Lemmatization, Language Translation, Stop Word Removal, Feature Extraction from Texts- Extracting General Features from Raw Text, Bag of Words ,TF-IDF, Feature Engineering- Word Clouds, Other Visualizations.	12
IV	**Collecting Text Data from the Web**: Introduction, Collecting Data by Scraping Web Pages-Extraction of Tag-Based Information from HTML Files, Requesting Content from Web Pages-Collecting Online Text Data, Analyzing the Content of Jupyter Notebooks (in HTML Format), Extracting Information from an Online HTML Page, Dealing with Semi-Structured Data- Dealing with JSON Files, Dealing with a Local XML File. **Text Summarization and Text Generation**: Introduction, What is Automated Text Summarization?-Benefits of Automated Text Summarization, High-Level View of Text Summarization-Purpose, Input, Output, Extractive Text Summarization, Abstractive Text Summarization, Sequence to Sequence, Encoder Decoder, Summarizing Text Using Word Frequency-Word Frequency Text Summarization.	12
V	**Vector Representation:** Introduction, Vector Definition**,** Why Vector Representations? Encoding, Character-Level Encoding Character Encoding Using ASCII Values, Character Encoding with the Help of NumPy Arrays, Positional Character-Level Encoding- Character-Level Encoding Using Positions**,** One-Hot Encoding-Key Steps in One-Hot Encoding, Character One-Hot Encoding – Manual. **Sentiment Analysis:** Why is Sentiment Analysis Required?**,** Types of Sentiments**,** Applications of Sentiment Analysis**,** Tools Used for Sentiment Analysis, TextBlob **-** Basic Sentiment Analysis Using the TextBlob Library.	12

Prescribed Textbook			
	Author	Title	Publisher
1	Jalaj Thanaki	Python Natural Language Processing	Packt Publishing Ltd Ist. Edition 2017 UNIT-I,II
2	Sohom Gosh	Natural Language Processing Fundamentals	Packt Publishing Ltd. 1st Edition 2019 UNIT I ,II -III,IV and V

Reference Textbooks			
	Author	Title	Publisher
1	Daniel Jurafsky, James H. Martin	Speech and Language Processing	Pearson 3rd edition 2021
2	Christopher D. Manning, Hinrich Schütze	Foundations of Statistical Natural Language Processing	The MIT Press, 1st edition 1999

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : Natural Language Processing
Course Code : 22CS4E7
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions **(5×4=20 Marks)**

1. (a)Define Natural Language Processing. What are the advantages of NLP and Python? (CO1, L1)
   (or)
   (b) What are the basic applications of NLP. (CO1, L1)

2. (a) What are the differences between NLU and NLG? (CO1, L1)
   (or)
   (b) Define Regular expression. Explain basic regular expressions? (CO1, L1)

3. (a) Explain Types of Data used in Feature Extraction Method. (CO2, L2)
   (or)
   (b) Explain about porter stemmer. (CO2, L2)

4. (a)Explain Automated Text Summarization and its benefits.(CO3, L2)
   (or)
   (b) Explain Collecting Data by Scraping Web Pages with example. (CO4, L2)

5. (a) Explain Character Encoding Using ASCII Values. (CO4, L2)
   (or)
   (b) Explain types of Sentiment Analysis. (CO5, L2)

SECTION-B

Answer ALL questions **(5×10=50 Marks)**

6. (a) Define Natural Language. What are the Advanced Applications used in NLP? (CO1, L1)
   (or)
   (b) Define Tokenization and PoS Tagging in NLP with example. (CO1, L1)

7. (a) Explain about Advanced Regular Expressions with example. (CO1, L5)
   (or)
   (b) Explain about CFG and PCFGs with examples. (CO1, L5)

8. (a) Explain about types of Tokenizers and issues with Tokenization. (CO2, L2)
   (or)
   (b) Explain about Feature Engineering. (CO2, L2)

9. (a)Explain Semi-Structured Data using XML and JSON files. (CO4, L5)
   (or)
   (b) Explain High-Level View of Text Summarization. (CO3, L5)

10.(a) Discuss about one hot encoding? (CO5, L6)
   (or)
   (b) Develop Basic Sentiment Analysis using TextBlobLibrary. (CO5, L6)

DYNAMIC WEB PROGRAMMING USING PYTHON

Course Code	**:**	**22CS4E8**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Skill Enhancement Course				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Dynamic Web Programming Using Python is a course that illustrates concepts of. Dynamic Web Programming, Basic Concepts of Server-Side Development, Advanced JavaScript and DOM Manipulation, Frontend Frameworks, Server-Side Frameworks, Database Integration, Building RESTful APIs, Security in Web Development and Emerging Trends in Dynamic Web Development

Course Objectives:
This course will help enable the student to understand and learn various Concepts of Dynamic Web Programming, Basic Concepts of Server-Side Development, Advanced JavaScript and DOM Manipulation, Frontend Frameworks, Server-Side Frameworks, Database Integration, Building RESTful APIs, Security in Web Development and Emerging Trends in Dynamic Web Development.

Specific Objectives include:
- Learn to create engaging websites using HTML, CSS, and JavaScript.
- Learn to use advanced JavaScript for creating dynamic and interactive web content.
- Construct secure and RESTful APIs for effective web development.
- Explore and analyse the latest emerging trends in dynamic web development.

Course Outcomes: On successful completion of course, students should be able to

CO1	Recall Evolution of Web Development, Basics of HTML, CSS, and JavaScript, Server-Side Development Basics
CO2	Demonstrate advanced JavaScript and Frontend Frameworks, Database Integration
CO3	Apply and integrate server-side frameworks, Security in Web Development.
CO4	Analyse Security in Web Development, showcasing synthesis and evaluation in web development.
CO5	Evaluate RESTful APIs, emerging trends in dynamic web development and DOM manipulation.

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction to Dynamic Web Programming:** Evolution of Web Development-Static vs. Dynamic Websites, Emergence of Dynamic Content, Client-Side vs. Server-Side Programming-Roles and Responsibilities, Communication between Client and Server**,** Basics of HTML, CSS, and JavaScript-HTML Structure and Tags, CSS Styling and Layout, JavaScript Fundamentals, Setting up a Development Environment - Code Editors (e.g., Visual Studio Code) ,Local Web Servers (e.g., Node.js). **Server-Side Development Basics:** Server-Side Scripting Languages-Overview of PHP, Python, Node.js- Choosing the Right Language for the Task, Handling Form Submissions- Form Elements and Attributes, Processing Form Data on the Server, Introduction to Databases and Server-Side Data Handling-Basics of Database Design, Connecting to Databases from Server-Side. Code- Server Virtualization and its Relevance-Virtual Machines vs. Containers, Benefits of Server Virtualization.	12

II	**Advanced JavaScript and DOM Manipulation:** Advanced JavaScript Concepts-Closures, Promises, Async/Await**,** Manipulating the Document Object Model (DOM)**-**Selecting and Modifying DOM Elements, Creating and Appending Elements**,** Event Handling and Delegation-Responding to User Interactions**,** Delegating Events for Efficiency**,** Asynchronous Programming and AJAX**-**Making Asynchronous Requests**,** Handling Responses with Callbacks and Promises. **Introduction to Frontend Frameworks**: Overview of Frontend Frameworks- React, Angular, Vue.js Component-Based Architecture-Building Reusable Components, Managing State in Components State Management in Frontend Applications- Local State vs. Global State, Tools for State Management (e.g., Redux, Context API), Building a Simple Frontend Application using a Framework- Creating a Project Structure, Implementing Basic Functionality.	12
III	**Server-Side Frameworks:** Introduction to Server-Side Frameworks**-**Express.js, Django, Flask, Routing and Middleware in Server-Side Frameworks-Defining Routes and Handling HTTP Methods, Implementing Middleware for Request Processing**-**Handling Requests and Responses-Processing Client Requests**,** Constructing Server Responses**,** building a Basic Server-Side Application- Structuring the Project**,** Implementing CRUD Operations. **Database Integration:** Connecting to Databases-MySQL, MongoDB, SQLite**,** Establishing Database Connections**,** CRUD Operations (Create, Read, Update, Delete)- Writing SQL Queries and Commands. Handling Database Transactions**,** Data Modelling and Schema Design-Entity-Relationship Diagrams, Normalization and Denormalization, Database Security Considerations- SQL Injection Prevention, Authentication and Authorization.	12
IV	**Building RESTful APIs:** Introduction to RESTful Architecture**-**Principles and Constraints**,** RESTful API Design Best Practices**,** Creating APIs with Server-Side Frameworks**-**Defining Endpoints and Methods, Handling API Requests and Responses, Consuming APIs on the Client Side-Making API Requests from Frontend Applications, Handling API Responses and Errors, Authentication and Authorization in APIs-Token-Based Authentication, Role-Based Authorization. **Security in Web Development:** Common Web Vulnerabilities-Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF)**,** Securing Web Applications-Input Validation and Sanitization**,** Secure Communication (HTTPS)**,** Best Practices for Web Security-Content Security Policy (CSP)**,** Two-Factor Authentication (2FA).	12
V	**Emerging Trends in Dynamic Web Development:** Progressive Web Apps (PWAs)-Offline Capabilities, Push Notifications, Web Assembly and its Applications**-**Running Native Code in Browsers, Serverless Architecture-Functions as a Service (FaaS), Benefits and Use Cases, Future Trends in Dynamic Web Development- Voice Interfaces, Artificial Intelligence in Web Development.	12

Prescribed Textbooks			
	Author	Title	Publisher
1	Steve Holden	Python Web Programming	New Riders,2022

Reference Textbooks			
	Author	Title	Publisher
1	Miguel Grinberg,	Flask Web Development/; Developing Web Applications with Python	O'Reilly Media.2020
2	William S. Vincent,	Django for Beginners: Build websites with Python and Django"	William S. Vincent.2022

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : Dynamic Web Programming Using Python
Course Code : 22CS4E8
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions **(5×4=20 Marks)**

1. (a) Explain the basics of CSS styling and layout in web development, emphasizing their role (CO1, L2)
(or)
(b) Explain the fundamentals of JavaScript and their importance in dynamic web content creation (CO1, L2)
2. (a) How do three advanced concepts in JavaScript contribute to enhancing web interfaces? (CO2, L1)
(or)
(b) How does JavaScript manipulate the Document Object Model (DOM)? (CO2, L1)
3. (a) Define routing in the context of server-side frameworks.? (CO3, L1)
(or)
(b) Define authentication and authorization in the context of server-side applications.? (CO3, L1)
4. (a) Explain the concept of Cross-Site Request Forgery (CO3, L2)
(or)
(b) Explain *the c*oncept of token-based authentication in the context of RESTful APIs. (CO5, L2)
5. (a) Discuss the significance of push notifications in PWAs and how they enhance user engagement. (CO5, L6)
(or)
(b) Discuss the emerging trend of voice interfaces in dynamic web development. (CO5, L6)

SECTION-B

Answer ALL Questions **(5×10=50 Marks)**

6. (a) Explain the evolution of web development, highlighting the differences between static and dynamic websites. (CO1, L2)
(or)
(b)Explain the importance of a development environment in dynamic web programming. (CO1, L2)

7. (a) Compare and contrast Callbacks and Promises in asynchronous JavaScript. (CO2, L2)
(or)
(b) Compare and contrast local state and global state in the context of frontend applications. (CO2, L2)

8. (a) Explain the implementation of CRUD operations with examples (CO2, L5)
(or)
(b) Explain the importance of handling database transactions in server-side applications. Give one example (CO3, L5)

9. (a) Explain in detail the key principles and constraints of the RESTful architecture. (CO5, L2)
(or)
(b) Explain the principles of role-based authorization and its implementation in the context of RESTful API's (CO5, L2)

10 (a) Explain the concept of server less architecture and highlight its key distinctions from traditional server-based models. (CO5, L5)
(or)
(b) Explain specific applications where leveraging Web Assembly is advantageous for web developers. (CO5, L5)

BUSINESS ANALYTICS USING TABLEAU

Course Code	**:**	**22CS4E9**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Skill Enhancement Course				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
The Business Analytics Using Tableau course is designed to teach participants how to analyse, visualize, and interpret data for business decision-making using Tableau, a leading data visualization tool. The course covers key topics such as connecting Tableau to various data sources, data preparation, creating dynamic visualizations (e.g., bar charts, scatter plots, and maps), and building interactive dashboards. Learners will also explore advanced Tableau features like calculated fields, parameters, and forecasting to enhance their analytical capabilities. The course aims to equip professionals with the skills to transform complex datasets into actionable insights, enabling them to make data-driven decisions, communicate findings effectively through visual reports, and optimize business strategies across industries such as finance, marketing, healthcare, and retail. This course is ideal for business analysts, data analysts, marketing professionals, and anyone interested in enhancing their data analysis and visualization skills for more informed decision-making.

Course Objectives:
The objective of the Business Analytics Using Tableau course is to help participants develop the skills needed to analyse and visualize data effectively using Tableau. By the end of the course, learners will understand how to connect Tableau to different data sources, clean and prepare data for analysis, and create various visualizations like charts, graphs, and maps. They will also learn how to build interactive dashboards, use advanced features such as calculated fields and forecasting, and apply their knowledge to real-world business scenarios. The goal is to enable students to turn data into meaningful insights that drive better business decisions.

Specific Objectives include:
- Learning how to connect Tableau to various data sources, such as Excel and SQL databases.
- Understanding data preparation techniques, including filtering, aggregating, and handling missing values.
- Gaining the ability to create a variety of visualizations, like bar charts, line graphs, and maps.
- Developing skills to design interactive dashboards and reports for effective data communication.
- Exploring advanced Tableau features, such as calculated fields, parameters, and forecasting for deeper analysis.

Course Outcomes: On successful completion the students should be able to

CO1	Participants will be able to connect Tableau to different data sources for analysis.
CO2	Learners will gain the ability to clean and prepare data for accurate visualization.
CO3	Students will be able to create various types of visualizations, such as charts and maps.
CO4	Learners will be able to design interactive dashboards for effective data storytelling.
CO5	Participants will apply advanced Tableau features to perform deeper data analysis and forecasting.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	Introduction to Tableau & Data Visualization: Introduction to Tableau, Tableau Architecture, Tableau Server Architecture, VizQL, introduction to Tableau Prep, Tableau Prep, Builder User Interface, Data Visualization, Business Intelligence tools. Tableau Desktop Installation.	12
II	Data Visualization using Tableau: Visualizations, Functions in Tableau, Join and Union, Sort, Set, Forecasting, Highlighting, Device designer.	12
III	Visual Perception: Overview of perception, Visual analysis, Visual Perception. Components of Tableau: Tableau Product family, Connecting to data, Filters, Sets, Groups, Datatypes, Measures and Dimensions.	12
IV	Charts & Graph: Generated fields in Tableau, used cases in generated fields, building charts in tableau, Features of Tableau, Use case: IPL.	12
V	Functions: Numbers, Strings, Type Conversions, Aggregate and Logical Functions. Parameters: parameters in Tableau, creating a parameter, using parameter in calculation, parameter in control, using parameter in visualization.	12

TEXTBOOK:
Business Analytics: An Application Focus 3.75 by Purba Halady Rao, PHI Learning

REFERENCE BOOKS:
1. Business Analytics: Data Analysis and Decision Making with MindTap, 7th Edition Paperback – 1 September 2022
2. Business Analytics | Third Edition| By Pearson Paperback – 29 January 2021 by James R.Evans

E- Content:
https://www.youtube.com/watch?v=aHaOIvR00So

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Fourth Semester (w.e.f. admitted batch 2022-23)

Course Name : BUSINESS ANALYTICS USING TABLEAU
Course Code : 22CS4E9
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions **(5×4=20 Marks)**

1. (a) What is VizQL in Tableau, and how does it contribute to data visualization? (CO2, L2)
(or)
(b) Explain the purpose and features of Tableau Prep. (CO3, L2)

2. (a) How do you use joins and unions in Tableau to combine data from multiple sources? (CO2, L1)
(or)
(b) What is the function of the Device Designer in Tableau? (CO4, L2)

3. (a) What are the key components of visual perception that enhance data visualization? (CO6, L2)
(or)
(b) How does visual analysis improve the way data is presented in Tableau? (CO3, L2)

4. (a) What is the role of filters and sets in Tableau when working with data? (CO4, L1)
(or)
(b) Differentiate between measures and dimensions in Tableau. (CO4, L1)

5. (a) What are logical functions in Tableau, and how can they be used to filter data? (CO4, L4)
(or)
(b) How do you create and use parameters in Tableau for calculations? (CO4, L4)

SECTION-B

Answer ALL Questions **(5×10=50 Marks)**

6. (a) Explain the architecture of Tableau and how it handles data processing and visualization. Include the roles of Tableau Server and Tableau Prep in the overall process. (CO1, L2)
(or)
(b) Discuss the importance of data visualization in business intelligence tools. How does Tableau facilitate the process of turning raw data into insightful visualizations?

7. (a) Explain the various functions available in Tableau for creating visualizations. Discuss how sorting, forecasting, and highlighting enhance the effectiveness of data presentation. (CO4, L6)
(or)
(b) Describe the process of connecting Tableau to different data sources. What are the steps involved in joining and uniting data in Tableau to create comprehensive reports? (CO1, L6)

8. (a) How does the concept of visual perception impact the design of data visualizations? Discuss how the understanding of perception is applied in Tableau to create more effective and intuitive charts. (CO6, L5)
(or)
(b) Explain the role of visual analysis in Tableau. How can users apply visual perception techniques to improve the interpretability and clarity of their visualizations? (CO3, L5)

9. (a) Describe the key components of Tableau, including the Tableau Product family, data connection process, filters, sets, and groups. How do these components work together to streamline data analysis? (CO6, L5)
(or)
(b) Differentiate between measures and dimensions in Tableau. Provide examples of when each type should be used and explain how they contribute to data analysis and visualization. (CO2, L5)

10 (a) Explain the various types of charts and graphs that can be created using Tableau. How can these charts be customized to suit different business requirements and user needs? (CO1, L5)
(or)
(b) Provide use cases where generated fields are helpful in building specific types of charts and visualizations, such as in the case of IPL data. (CO6, L5)

COMPUTER NETWORKS

Course Code	:	**22CS2T1**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Core				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Computer Networks is a course that will exemplifies basic concepts of Computer Networks, Functionality of Layered Architecture, Error Correction and Detection Code and Various Protocols used in Layers and Protocols, Functionality of Medium Access Control Sub Layer, Various Routing Strategies used in internet working using IP Addresses, Different Services and Protocols of Transport Layer and Various Application Layer Protocols used over the internet.

Course Objectives:
This course will help the students t o understand and learn importance of Protocols in a Network, The usage of the Protocols in Layered Architecture and brief information of functionality of all the Five Layers and their Protocols.

Specific objectives include:
- To understand functionality of Layered Architecture.
- To understand Ethernet, Bluetooth and Data Link Layer Switching.
- To learn Network Layer Design issues and Routing Algorithm used.
- To learn Transport Services and TCP and UDP.
- To understand the Protocols and services of Applications Layer.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Define functionality of Layered Architecture, Error Correction and Detection Codes.
CO2	Classify reference models, different Services and Protocols, algorithms and Routing Algorithms
CO3	Explain Switching, Design Issues of layers, TCP and UDP
CO4	Compare different architectures, services and Protocols of different layers
CO5	List types of bridges, network devices Application, Transport, network Layer Protocols.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction:** Uses of Computer Networks: Business Application, Home Applications, Mobile Users, Social Issues, Connection Oriented and Connectionless Services, Service Primitives, The relationship of Services to Protocols, **Reference Models:** The OSI Reference Model, The TCP/IP Reference Model, A Comparison of OSI and TCP/IP Reference Model. **Physical Layer:** ALOHA, CSMA, CSMA/CA. **Data Link Layer: Data Link Layer Design Issues**: Services Provided to the Network Layer, Framing, Error Control, Flow Control, **Error Correcting Codes**, **Error Detecting Codes**, **Elementary Data Link Protocols**: An Utopian Simplex Protocol, A Simplex Stop and Wait Protocol, A Simplex Protocol for a Noisy Channel, **Sliding Window Protocols:** A One Bit Sliding Window Protocol, A Protocol Using GoBackN, A Protocol using Selective Repeat	12

II	**The Medium Access Control Sub Layer: *Ethernet***: Ethernet Cabling, Manchester Encoding, The Ethernet MAC sub layer Protocol, The Binary Exponential Backoff Algorithm, ***Bluetooth***: Bluetooth Architecture, Bluetooth Applications, The Bluetooth Protocol Stack, The Bluetooth Radio Layer, The Bluetooth Link Layers, The Bluetooth Frame Structure, ***Data Link Layer Switching***: Uses of Bridges, Learning Bridges, Spanning Tree Bridges, Remote Bridges, Repeaters, Hubs, Bridges, Switches, Routers and Gateways, and Virtual LANs.	12
III	**The Network Layer: Network Layer Design Issues:** Store and Forward Packet Switching, Services provided to the Transport Layer, Implementation of Connectionless Services, Implementation of Connection Oriented Services, Comparison of Virtual Circuit and Datagram subnets. Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts the Network Layer on the Internet: The IPVersion4 Protocol, IP Address, IPV6 Features and Advantages.	12
IV	**The Transport Layer: The Transport Service:** Services provided to the Upper Layers, Transport Services Primitives, Berkeley Sockets. Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery. **The Internet Transport Protocols:** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modelling TCP Connection Management, TCP Sliding Window, TCP Congestion Control, Comparison of TCP and UDP.	12
V	**Wireless TCP:** Classical improvement in WTCP. **The Application Layer: *DNS*:** The Domain Name System: The DNS Name Space, Resource Records, Name Servers. ***Electronic Mail***: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery. **The *World Wide Web****:* Architecture Overview, Static Web Pages, Dynamic Webpages**. *Streaming Audio and Video***: Digital Audio, Digital Video, Streaming Stored Media, Streaming Live Media, And Real Time Conferencing.	12

Reference Textbooks:

1. Andrew S.Tanenbaum, Computer Networks, Sixth Edition, Pearson, 2021
2. James F.Kurose, Keith WRoss, Computer Networking, 3rd Edition, Pearson Edition
3. Michael A.Gallo, William M.Hancock, Data Communications and Networking, 4thEdition, TMH

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Second Semester (w.e.f. admitted batch 2022-23)

Course Name : Computer Networks
Course Code : 22CS2T1
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL Questions. All Questions Carry Equal Marks. (5×4=20 Marks)

1.(a) What are the Uses of Computer Networks. (CO1, L1)

(or)

(b) Explain about ALOHA (CO1, L2)

2. (a) Explain about The Binary Exponential Backoff Algorithm. (CO1, L2)

(or)

(b) Explain about Virtual LANs. (CO3, L2)

3. (a) What is Store and Forward Packet Switching. (CO3, L1)

(or)

(b) What are the Features of IPV6. (CO2, L1)

4. (a) Explain about Berkeley Sockets. (CO4, L2)

(or)

(b) Explain TCP Congestion Control. (CO3, L2)

5. (a) Explain about WTCP. (CO5, L5)

(or)

(b) Explain about URLs. (CO5, L5)

SECTION-B

Answer ALL Questions. All Questions Carry Equal Marks. (5×10=50 Marks)

6. (a) Explain the OSI Reference Model with a neat diagram. (CO2, L2)

(or)

(b) Explain Sliding Window Protocols. (CO2, L2)

7. (a) List the operations of Ethernet. (CO2, L4)

(or)

(b) Analyse Bluetooth Architecture with Bluetooth Application. (CO4, L4)

8. (a) Model Shortest Path Routing Algorithm. (CO2, L3)

(or)

(b) Select IP Addressing Techniques. (CO2, L5)

9. (a) Explain about Connection Establishment and Connection Release. (CO5, L5)

(or)

(b) Explain about TCP. (CO3, L5)

10. (a) Explain Domain Name System. (CO5, L5)

(or)

(b) Explain Electronic Mail System. (CO5, L5)

DATA STRUCTURES

Course Code	**:**	**22CS2T2**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Core				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Data Structures is a course that illustrates Elementary Data Organization, Data Structure Operations, and Algorithms, Arrays, Matrices, String Processing, Stack, Queues, Linked List, Trees, Heap Sort, Multi-way Search Trees, B-Tree, B+-Trees, Graphs Algorithms, Elementary Graph Algorithms, Sorting and Searching Techniques.

Course Objectives:
This course will help enable the students t o understand, learn and develop Data Structure Operations and Algorithms, Arrays, Matrices, String Processing, Stack, Queues, Linked List, Trees, Heap Sort, Multi-way Search Trees, B-Tree, B+-Trees, Graphs Algorithms, Elementary Graph Algorithms, Sorting and Searching Techniques.

Specific Objectives include:
- To understand *Data Structures*, *Data Structure Operations* and *Algorithms*, *Arrays*.
- To understand *String Processing, Stack, Queues and Linked List.*
- To learn the *Binary Tree, Binary Search Trees, AVL Trees, Heap*.
- To learn the *Multi-way Search Trees*, *B-Trees*, *B+-Trees*.
- To understand the *Graph Algorithms*, different *Sorting* and *Searching Techniques*.

Course Outcomes:
At the end of this course the students should be able to:

CO1	Define Data Structures, Data Structure Operations.
CO2	Demonstrate Arrays, String Processing, Stack, Queues and Linked List, Graph Algorithms.
CO3	Construct the Binary Tree, Binary Search Trees, AVL Trees, Heap, Multi-way Search Trees, B-Trees, B+-Trees.
CO4	Analyse Sorting and Searching Techniques and various algorithms.
CO5	Solve problems using different algorithms for searching and sorting.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction and Overview:** Elementary Data Organization, Data Structures, Data Structure Operations, and Algorithms: Complexity, Time and Space Trade-off Asymptotic Notations. Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting, Linear Search, Binary Search, Multidimensional Arrays, Pointer Arrays, Record Structures, Representation of records in memory, Parallel Arrays, Matrices, Sparse Matrices.	12
II	**String Processing:** Pattern Matching Algorithms. **Stacks:** Stacks, Array representation, Linked List representation, Evaluation of Arithmetic Expressions, Quick Sort, Recursion, Towers of Hanoi. **Queues:** Linked representation of Queues, Deques, Priority Queues.	12

III	**Linked Lists:** Representation, Traversing, Searching, Memory Allocation: Garbage Collection, Insertion, Deletion, Header Linked Lists, Two Way Lists. **Trees:** Binary Trees, Representing and Traversing Binary Trees, Traversal Algorithms using Stacks, Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, AVL Search Trees, Insertion and Deletion AVL Trees. **Heap:** Heap Sort, Huffman's Algorithms, General Trees.	12
IV	**Multi-way Search Trees:** M-Way Search Trees, Definition and Properties, Searching an M-Way Search Tree, B-Trees, Definition and Properties, Number of Elements in a B-Tree, Insertion into B-Tree, Deletion from a B-Tree, B+-Tree Definition, Searching a B+-Tree, Insertion into B+-Tree, Deletion from a B+-Tree.	12
V	**Graphs:** Graphs Algorithms, Elementary Graph Algorithms: Topological Sort, Single Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford, All Pairs Shortest Paths: Floyd Warshall's Algorithm. **Sorting and Searching:** Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and Data Modification, Hashing.	12

Reference Textbooks:

1. Seymour Lipschutz, Data Structures, McGraw-Hill (Schaums Outlines), Revised First Edition, 2014.
2. Seymour Lipchitz, Theory and Problems of Data Structures, McGraw Hill (Schaums Outlines), Paperback, 2017.
3. John R Hubbard, Second Edition, Data Structures with Java, McGrawHill (Schaums Outlines), 2009.
4. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education, 2017.
5. Fundamentals of Data Structures in C, Second Edition, Horowitz, Sahani, Anderson-freed, Universities Press, 1993.
6. Data Structures: A Pseudocode Approach, Richard FGilberg, Behrouz A Forouzan, Cengage, 2004

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Second Semester (w.e.f. admitted batch 2022-23)

Course Name : Data Structures
Course Code : 22CS2T2
Time : 3 Hours
Max Marks : 70 Marks

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4=20Marks)

1.(a) Explain different Data Structure Operations. (CO1, L2)
(or)
(b) Explain Linear Array. (CO2, L2)

2. (a) What is Stack? Explain its operations. (CO2, L1)
(or)
(b) Define Linked List and its operations. (CO2, L1)

3. (a) Explain Binary Search Trees. (CO3, L2)
(or)
(b) Explain General Trees. (CO3, L2)

4. (a) Explain M-Way Search Tree. (CO3, L2)
(or)
(b) Explain searching an element from B+-Tree. (CO6, L2)

5. (a) Explain Topological Sort Algorithm. (CO6, L2)
(or)
(b) Explain Bellman-Ford Algorithm. (CO6, L2)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10=50 Marks)

6. (a) Explain Binary Search and Linear Search Algorithms with example. (CO6, L2)
(or)
(b) Explain Multidimensional Arrays in Java with example. (CO2, L2)

7. (a) Explain Towers of Hanoi Problem implementation with example. (CO2, L5)
(or)
(b) Explain Operations of Queue using Linked List with example. (CO2, L5)

8. (a) Explain AVL Search Trees operations in detail. (CO3, L5)
(or)
(b) Explain the insertion and deletion operations of Binary Search Trees with example. (CO3,L5)

9. (a) List B-Tree operations with examples. (CO3, L4)
(or)
(b) List insertion and deletion operations of B+-Tree with examples. (CO3, L4)

10. (a) Utilize Merge Sort Algorithm to sort the elements 10, 45, 15, 56, 48, 23, 8, 17. Explain step by step procedure. (CO6, L3)
(or)
(b) Make use of elements 23, 34, 12, 45, 14, 73, 21, 7 perform sort using Radix Sort. (CO6, L3)

WEB TECHNOLOGIES

Course Code	**:**	**22CS2T3**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Core				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
This course illustrates about WWW, HTML, write code in JavaScript & DHTML, Designing of XML Files, Install and use Servlets and PHP, Programming in JSP, Establish Database Connectivity & Form Validations using C#, Basic knowledge of Node JS, Express & Spring Boot, Creating AJAX form validations.

Course Objectives:
The course will help the students to understand, learn and build WWW, HTML, write code in JavaScript & DHTML, Designing of XML Files, Install and use Servlets and PHP, Programming in JSP, Establish Database Connectivity & Form Validations using C#, Basic knowledge of Node JS, Express & Spring Boot, Creating AJAX form validations.

Course Objectives:
- To understand the concepts of WWW including Browser and HTTP Protocol and various HTML Tags and use them to develop the user-friendly web pages.
- To use the JavaScript and define the CSS with its types to develop the Dynamic Web Pages.
- Students will be able to and develop the Modern Web Pages using the XML Elements and Servlets with different layouts as per need of applications.
- Able to develop Server-Side Scripting with PHP and JSP to generate the Web Pages dynamically using the Database Connectivity & C# Database Connectivity with Form Validations.
- Able to develop Interactive Forms for Web Applications using Node JS, Express, Spring Boot & AJAX.

Course Outcomes: On successful completion of this course, the students able

CO1	How to Retrieve Data from the Web, Connect to a Database
CO2	Explain XML Attributes, String Processing, Approaches in Form Handling.
CO3	Make use of Cascading Style Sheets, DTD Attributes, Cookies, Filters and Transitions, Terminal, Editors, npm
CO4	Inference Spring Boot, JSP, Saving Time with Express, Form Handling.
CO5	Discuss Servlets, Servlet Life Cycle, Servlets API, Servlets Chaining.

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Introduction:** What is Internet, History of Internet, Internet Services and Accessibility, Uses of the Internet, Protocols. **Web Concepts:** The Client/Server Model, Retrieving Data from the Web, How the Web Works? Web Browsers, Searching information on the Web, Internet Standards. **HTML:** Outline of an HTML Document, Head Section Body Section**,** Headers, Paragraphs, Text Formatting, Linking, Internal Linking, Embedded Images, Lists, Tables, Frames, Other Special Tags and Characters, HTML Forms.	12

II	**Java Script:** Introduction to Scripting, Control Statements I, Control Statements II, Functions, Arrays, Objects, Document Object Model, Events. **Dynamic HTML (DHTML):** Introduction, Cascading Style Sheets (CSS), Coding CSS, Properties of Tags, Property Values, Other Style Properties, In Line Style Sheets, Embedded Style Sheets, External Style Sheets, Grouping - Inheritance, Class as Selector, ID as Selector, Contextual Selector, Pseudo Classes and Pseudo Elements, Positioning - Backgrounds, Element Dimensions, DHTML Document Object Model and Collections, Using the Collections All, Moving Object around the Document, Event Handling, Assigning Event Handlers, Event Bubbling, Filters and Transition Filters, Transitions, Data Binding, Using Tabular Data Control, Sorting Data, Dynamic Sorting, Filtering.	12
III	**XML:** Introduction, HTML vs. XML, Syntax of XML Document, XML Attributes, Use of elements vs. Use of Attributes, XML Validation, Well Formed XML Documents, Valid XML Documents, XML DTD: Internal DTD, External DTD, The Buildings blocks of XML Documents. **DTD Elements**: Declaring an Element, Empty Elements, Elements with Data, Elements with Children, Wrapping, Declaring only one Occurrence of the Same Elements, Declaring Minimum one Occurrence of the Same Element, Defining Zero or One Occurrence of the Same Element, Declaring Mixed Content, **DTD Attributes**: Declaring Attributes, Default Attribute Value, Implied attribute, required attribute, fixed attribute value, enumerated attribute values, DTD Entries, DTD Validation, XSL, XSL Transformation, XML Namespaces, XML Schema. **Servlets**: Introduction, Advantages of Servlets over CGI, Installing Servlets, The Servlet Life Cycle, Servlets API, A Simple Servlet, Handling HTTP Get Requests, Handling HTTP Post Requests, Cookies, Session Tracking, Multi-Tier Applications using Database Connectivity, Servlets Chaining.	12
IV	**PHP:** Introduction, PHP Basics, String Processing and Regular Expressions, Form Processing and Business Logic, connecting to a Database, Using Cookies, Dynamic Content, Operator Precedence Chart. **Java Server Pages (JSP):** Introduction, Advantages of JSP, developing first JSP, Components of JSP, Reading Request Information, Retrieving the Data Posted from a HTML File to a JSP File, JSP Sessions, Cookies, Disabling Sessions. **Database Connectivity & Form Validations using C#:** Database Connectivity using C#.Net, Form Validations (Name Validation, Integer Validation, Floating Point Validation, Email Validation, Combo Box Validation). **Spring Boot:** Introduction to Spring Boot, Spring Initializer, Maven, Gradel, Class Path Dependencies Creating Executable Jar File.	12
V	**Getting Started with Node:** Getting Node, Using the Terminal, Editors, npm, A Simple Webserver with Node (Hello World, Event Driven Programming, Routing, Serving Static Resource). **Saving Time with Express:** Scaffolding, Initial Steps (Views and Layouts, Static Files and Views, Dynamic Content in Views). **Form Handling:** Sending Client Data to Server, HTML Forms. Encoding, Approaches in Form Handling, Form Handling with Express, Handling AJAX Forms-File Uploads, jQuery File Upload.	12

Reference Books:

1. N.P. Gopalan, J. Akilandeswari, Web Technologies - A Developer's Perspective, PHI (2008)
2. Harvey M.Deitel and Paul L. Deitel, Internet and World Wide Web How To Program, Prentice Hall, 5th Edition.
3. Ethan Brown, Web Development with Node & Express, O'Reilly, First Edition, 2014.

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Second Semester (w.e.f. admitted batch 2022-23)

Course Name : Web Technologies
Course Code : 22CS2T3
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4=20Marks)

1. (a) What are protocols used in accessing the internet? (CO1, L1)
(or)
(b) What are the differences between Inline &Block Elements? (CO3, L1)
2. (a) What is DOM? Explain it. (CO3, L1)
(or)
(b) What is advantage of using External Style Sheets? (CO3, L1)
3. (a) What is XML Document Validation? Explain in detail. (CO2, L1)
(or)
(b) What is Servlet? Explain in detail. (CO6, L1)
4. (a) List C# function to validate Name of the User. (CO2, L4)
(or)
(b) List the components of JSP. (CO4, L4)
5. (a) List various services of Web Browser. (CO1, L4)
(or)
(b) What are the features of jQuery? Explain it (CO4, L1)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10=50 Marks)

6. (a) Explain services of Internet and Web Browser. (CO1, L2)
(or)
(b) Explain Client-Server Architecture and Frame and its attributes with example program. (CO1, L2)
7. (a) List JavaScript variables and characteristics of Array objects. (CO3, L4)
(or)
(b) Examine building an External Style Sheet. Explain advantages and disadvantages of External Style Sheets with an example. (CO3, L4)
8. (a) Develop TDC, DTD with building blocks of DTD. (CO3, L3)
(or)
(b) Develop Life Cycle of Servlets. Write the session tracker that tracks the number of access and last access of data of a particular web page. (CO6, L3)
9. (a) Explain (i) String Processing (ii) Regular Expressions (iii) Cookies. (CO2, L5)
(or)
(b) Explain the components of JSP and write a JSP Program to accept username and Password from a user and validate them. (CO4, L5)
10. (a) Explain Class Path Dependencies. (CO4, L5)
(or)
(b) Explain how to upload Files using jQuery with example program. (CO4, L5)

RESEARCH METHODOLOGY & IPR

Course Code	**:**	**22PG201**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Skill Enhancement Course				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose*:*
The Intellectual Property Rights (IPR) course covers the legal framework and a principle governing intellectual property, including patents, trademarks, copyrights, and trade secrets. It explores the significance of intellectual property protection in fostering innovation, creativity, and economic development. It covers various research methods, techniques, and approaches used in different fields, including social sciences, natural sciences, humanities, and business. Topics typically include research design, data collection methods, sampling techniques, data analysis, interpretation of results, and ethical considerations in research.

Course Objectives*:* The course objectives of Intellectual Property Rights (IPR) include understanding the legal framework, exploring various forms of intellectual property, analyzing their role in innovation and economic development, and developing strategic management skills for intellectual property assets.

Specific objectives include:
1. To Understand the legal framework governing intellectual property rights.
2. To understand the role of intellectual property in fostering innovation.
3. 3.To understand the process of obtaining and enforcing intellectual property protection.
4. To understand strategic management skills for intellectual property assets.
5. To understand ethical considerations and compliance with intellectual property laws.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Recall basic concepts of research and formulate research problems and process.
CO2	Explain research and sampling design, Measurement & Scaling Techniques
CO3	Identify Hypothesis Formulation and Testing and interpretation of the data.
CO4	Inspect Research Report Writing to write a research report and thesis.
CO5	Discuss knowledge and understanding of IPR Filing and Rights

Syllabus

Unit No	Detailed syllabus	Lecture Hours
I	**Foundations of Research**: Meaning of Research Definitions of Research-Motivational Research-General Characteristics of Research-Criteria of Good Research Types of Research-Research Process, Research Methods vs. Methodology-Defining and Formulating the Research Problem-Review of Literature- Importance of Literature Review in Identifying Research Gaps Development of Working Hypothesis.	12
II	**Research Design, Sampling Concepts, and Data Collection Methods**: Meaning, Significance and Characteristics of Good Research Design, Types of Research Design: Exploratory Descriptive Experimental, Sampling Theory: Types of Sampling and Errors in Sampling, Data Collection: Types of Data, Sources of Data-Methods of Data Collection.	12

III	**Measurement & Scaling Techniques, Hypothesis Formulation and Testing**: Basic measurement scales Reliability and Validity, Definition and Types of Hypotheses, Hypothesis Formulation and Testing Procedure Analysis of Variance (ANOVA) One way and two-way classifications.	12
IV	**Research Report Writing and Presentation**: Report Writing: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports - Research Ethics, Conflict of Interest and Plagiarism	12
V	**Intellectual Property Rights (IPR):** Definition, Nature and Features of Intellectual Property Rights (IPR)-Types of Intellectual Property Rights Patents, Copy Rights, Trade Marks, Industrial Designs, Geographical Indications, Trade Secrets; Importance of Intellectual Assets- Challenges of securing Intellectual Assets, Procedure for Grant of Patents- Rights of a Patentee-Types of Infringement-Enforcement of IPR Intellectual Property Laws in India-Role of World intellectual Property Organization (WIPO).	12

PRACTICALCOMPONENTS:

- Students should identify different research problems with examples and describe the characteristics of researchable problems in their academic area / society / community / organization concerned.
- Students are to form in groups (a group consists of 4-6 students) and conduct critical literature survey regarding the identified research problems and prepare a brief literature review coupled with research gaps and working hypothesis.
- Students are required to identify and develop good research design to address the defined research problems.
- Students are expected to write the research design on Exploratory and Descriptive Research.
- Students are required to develop practical experience in writing is search proposal by conducting a thorough critical review of any three research proposals (examples).
- Students are expected to develop templates for technical report writing.
- Students should conduct a team based mini research project, which is a unified and practical case on a topic of their choice, with approximately 4-6 students per group.
- Students are expected to identify types of plagiarism in academic research, and how to avoid plagiarism in research.

REFERENCE BOOKS:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002, An introduction to Research Methodology, RBSA Publishers.
2. Cohen,L. Lawrence, M.,& Morrison, K.(2005), Research Methods in Education (5thedition). Oxford: Oxford University Press.
3. Kothari, C.R., 1990, Research Methodology: Methods and Techniques, New Age International.
4. Dornyei, Z. (2007). Research Methods in Applied Linguistics. Oxford: Oxford University Press.
5. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009, Research Methods: A Process of Inquiry, Allyn and Bacon.
6. Fink, A., 2009, Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications.

Important Websites:

- ➢ www.ipindia.nic.in-IntellectualPropertyOffice, India
- ➢ www.patentoffice.nic.in–Patent office, India
- ➢ http://copyright.gov.in/-CopyrightOffice, India
- ➢ ipr.icegate.gov.in–Automated Recordation &Targeting for IPR Protection
- ➢ http://www.icegate.gov.in-E-Commerceportal of Central Board of Excise and Customs
- ➢ www.ipab.tn.nic.in- Intellectual Property Appellate Board, India

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Second Semester (w.e.f. admitted batch 2022-23)

Course Name : RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS(IPR)
Course Code : 22PG201
Duration : 3 hours
Max Marks : 70

SECTION- A

Answer the Following Questions **(5X4 = 20 Marks)**

1. (a) Importance of Research (CO1, L1)
   (or)
   (b)Criteria for Good Research (CO1, L5)
2. (a) Primary Vs Secondary data (CO2, L4)
   (or)
   (b)Simple random Sampling (CO2, L1)
3. (a) Procedure for Testing of Hypothesis (CO3, L1)
   (or)
   (b)Measurement of Scales (CO2, L2)
4. (a) Layout of Research report (CO4, L3)
   (or)
   (b)Research Ethics (CO4, L1)
5. (a)Definition and Nature of IPR (CO5, L1)
   (or)
   (b) Enforcement of IPR (CO5, L3)

SECTION- B

Answer All Questions. **(5X10 = 50 Marks)**

6. (a) What is Research? Explain the research process in detail. (CO1, L1)
   (or)
   (b) Explain different types of research. (CO2, L2)
7. (a) What is Research Design? Distinguish between diagnostic and Exploratory Research designs. (CO2, L1)
   (or)
   (b) Explain Principal steps in a Sample Survey (CO2, L2)
8. (a) Explain the procedure for analysis of variance (ANOVA) two-way classification (CO3, L2)
   (or)
   (b) Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety differences are significant. (CO3, L4)

Plot of Land	Per acre production data		
	Variety of Wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

9. (a) Explain the significance of research report and narrate the various steps involved in writing such a report. (CO4, L5)
   (or)
   (b) Explain various types of research reports used in business research? (CO4, L5)
10. (a) Explain the importance of Intellectual Assets. (CO5, L5)
    (or)
    (b) Explain the procedure for grants of Patents. (CO5, L5)

SOFTWARE ENGINEERING

Course Code	**:**	**22CS2E1**	No. Of Lecture Hours per week		:	4
Year of Introduction	:	2022-23	Total No. Of Lecture Hours		:	60
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	4
Course Category	:	Domain Specific Elective				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Illustrates Process Models, Agile Development, Core Principles, Requirements Modelling, Data Modelling, Software Quality Assurance, Software Testing Strategies, Testing Conventional Applications, Project Management Concepts, Process and Project Metrics, Formal Modelling and Verification and Estimation for Software Project.

Course Objectives:
The course will help the students to understand, learn and build Process Models, Agile Models, Core Principles, Requirement Models, Data Models, Software Quality Assurance Procedures, Software Testing Strategies, and Strategies to Test Conventional Applications, Project Management Concepts, Process and Project Metrics, Formal Modelling and Verification and Models to estimate Software Projects.

Specific objectives include:
- To understand various Software Engineering Methods, Practices, Process Models and Agile Development Strategies.
- To understand and apply Core Principles, Requirements & Modelling Concepts.
- To understand and apply different Software Testing Approaches and various aspects of Software Quality Assurance.
- To understand and apply Process &Project Management Concepts.
- To understand and apply Software Estimates for Projects &apply Formal Methods Modelling.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Recall Software Application Domains, Process Models**,** and Agile Process Model, Scenario-Based Modelling.
CO2	Explain Data Modelling Concepts, Software Quality Assurance and Testing Strategies, Principles that Guide Practice.
CO3	Make use of Requirements Modelling and Testing Conventional Applications.
CO4	Estimate Functional Specifications and Decomposition Techniques.
CO5	Discuss Project Management Concepts and Metrics.

Syllabus

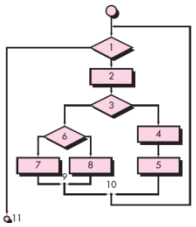
Unit No	Detailed syllabus	Lecture Hours
I	**Software and Software Engineering:** The Nature of Software: Defining Software, Software Application Domains, Legacy Software, The Unique Nature of Web Apps, Software Engineering, The Software Process, Software Engineering Practices: The Essence of Practice, General Principles, and Software Myths. **Process Models:** A Generic Process Model: Defining a Framework Activity, Identifying	12

	a Task Set, Process Patterns, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, a Final Word on Evolutionary Processes, **Specialized Process Models**: Component-Based Development, The Formal Methods Model, Aspect-Oriented Software Development, The Unified Process: A Brief History, Phases of the Unified Process, Personal and Team Process Models: Personal Software Process (PSP), Team Software Process(TSP). **Agile Development**: What Is Agility, Agility and the Cost of Change, What Is an Agile Process: Agility Principles, The Politics of Agile Development, Human Factors, Extreme Programming (XP): XP Values, The XP Process, Industrial XP, The XP Debate ,Other Agile Process Models: Adaptive Software Development(ASD),Scrum, Dynamic Systems Development Method(DSDM),Crystal, Feature Driven Development (FDD), Lean Software Development (LSD), Agile Modelling (AM),Agile Unified Process(AUP).	
II	**Principles that Guide Practice: Core Principles:** Principles That Guide Process, Principles That Guide Practice**,** Principles That Guide Each Framework Activity: Communication Principles, Planning Principles, Modelling Principles, Construction Principles, Deployment Principles. **Requirements Modelling: Scenarios, Information, and Analysis Classes:** Requirements Analysis: Overall Objectives and Philosophy, Analysis Rules of Thumb, Domain Analysis, Requirements Modelling Approaches, Scenario-Based Modelling: Creating a Preliminary Use Case, refining a Preliminary Use Case, writing a Formal Use Case, UML Models That Supplement the Use Case: Developing an Activity Diagram, Swim Lane Diagrams. **Data Modelling Concepts:** Data Objects, Data Attributes, Relationships, Class-Based Modelling: Identifying Analysis Classes, Specifying Attributes, Defining Operations, Class-Responsibility-Collaborator (CRC) Modelling, Associations and Dependencies, Analysis Packages.	12
III	**Software Quality Assurance:** Background Issues, Elements of Software Quality Assurance, SQA Tasks, Goals, and Metrics: SQA Tasks, Goals, Attributes, and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance: A Generic Example, Six Sigma for Software Engineering, Software Reliability, Measures of Reliability and Availability, Software Safety, The ISO 9000 Quality Standards, The SQA Plan. **Software Testing Strategies:** A Strategic Approach to Software Testing : Verification and Validation, Organizing for Software Testing, Software Testing Strategy-The Big Picture, Criteria for Completion of Testing, Strategic Issues, Test Strategies for Conventional Software: Unit Testing, Integration Testing, Test Strategies for Object-Oriented Software: Unit Testing in the OO Context, Integration Testing in the OO Context, Test Strategies for Web Apps, Validation Testing: Validation-Test Criteria, Configuration Review, Alpha and Beta Testing, System Testing: Recovery Testing, Security Testing, Stress Testing, Performance Testing, Deployment Testing, heart of Debugging: The Debugging Process, Psychological Considerations, Debugging Strategies, Correcting the Error, **Testing Conventional Applications:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing: Flow Graph Notation, Independent Program Paths, Deriving Test Cases, Graph Matrices, Control Structure Testing: Condition Testing, Data Flow Testing, Loop Testing, Black-Box Testing: Graph-Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.	12
IV	**Project Management Concepts:** The Management Spectrum: The People, The Product, The Process, The Project, People: The Stakeholders, Team Leaders, The Software Team, Agile Teams, Coordination and Communication Issues, The Product: Software Scope, Problem Decomposition, The Process: Melding the Product and the Process, Process Decomposition, the Project, the W5HH Principles. **Process and Project Metrics:** Metrics in the Process and Project Domains: Process Metrics and Software Process Improvement, Project Metrics, Software Measurement: Size-Oriented Metrics, Function-Oriented Metrics, Reconciling LOC and FP Metrics, Object-Oriented Metrics, Use-Case–Oriented Metrics, Web App Project Metrics, Metrics for Software Quality: Measuring Quality, Defect Removal Efficiency.	12

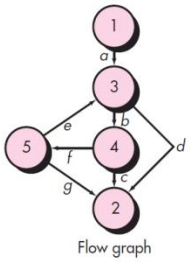
V	**Formal Modelling and Verification:** The Clean room Strategy, Functional Specification: Black- Box Specification, State - Box Specification, Clear-Box Specification, Clean room Design: Design Refinement, Design Verification, Clean room Testing: Statistical Use Testing, Certification, Formal Methods Concepts, Applying Mathematical Notation for Formal Specification, Formal Specification Languages: Object Constraint Language (OCL), The Z Specification Language. **Estimation for Software Projects:** Resources: Human Resources, Reusable Software Resources, Environmental Resources, Software Project Estimation, Decomposition Techniques: Software Sizing, Problem-Based Estimation, An Example of LOC-Based Estimation, An Example of FP-Based Estimation, Empirical Estimation Models: The Structure of Estimation Models, The COCOMO II Model, The Software Equation, Estimation for Object-Oriented Projects.	12

Practical / Case Studies:

- Draw example for Process Pattern when requirements are uncertain.
- Draw UML use case diagram for Safehome Security Function.
- Draw UML Activity Diagram for Access camera surveillance via the Internet - display camera views function.
- Draw UML Swimlane Diagram for Access camera surveillance via the Internet - display camera views function.
- Draw UML Class Diagram for Floor Plan.
- Draw UML Package for specifying Environment, Characters of the Game and Rules of the Game.
- Draw Level 1 DFD for Safehome Security Function
- Draw State diagram for Safehome Security Function
- Draw Sequence Diagram (partial) for the Safehome Security Function
- A UML Deployment Diagram for Safehome Security Function.
- Draw Flow Graph for Flow Chart and find the Cyclomatic Complexity.



- Draw the Graph Matrix for the Flow Graph



Flow graph

- Draw Generalization diagram by specifying Structural Constraint.
- Specify sample (a) Project Metrics (b) Product Metrics
- Specify (i) Decision Table (ii) Decision Tree in Block Box Testing
- Draw the Block Diagram for Block Handler and specify the logic using Object Constraint Language (OCL)

Reference Textbooks:

1. Roger S Pressman, Software Engineering-A Practitioner's Approach, Ninth Edition, McGraw-Hill, A Business Unit of The McGraw-Hill Companies, Inc., 2020.
2. Roger S Pressman, Software Engineering-A Practitioner's Approach, Seventh Edition, McGraw-Hill, A Business Unit of The McGraw-Hill Companies, Inc., 2010.
3. Summerville, Software Engineering, 7th Edition, Pearson Education, 2004.
4. S.A.Kelkar, Software Engineering-A Concise Study, PHI, January 2007.
5. Waman, Software Engineering, TMH, June 2004.
6. AH Behforooz and Frederick J. Hudson, Software Engineering Fundamentals, Oxford, 2008.

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc. (Computer Science), Second Semester (w.e.f. admitted batch 2022-23)

Course Name : Software Engineering
Course Code : 22CS2E1
Time : 3 Hours
Max Marks : 70

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4=20 Marks)

1. (a) What are various aspects of is PSP and TSP? (CO1, L1)
(or)
(b) What is SCRUM? Explain it in detail. (CO1, L1)
2. (a) What are the phases of Extreme Programming (XP)? (CO1, L1)
(or)
(b) What is Class-Based Modelling? Explain it by writing Class Diagram (CO2, L1)
3. (a) What is Software Reliability? Explain in detail. (CO2, L1)
(or)
(b) What is Alpha and Beta Testing? Explain in detail. (CO2, L1)
4. (a) List W5HHPrinciples. (CO6, L4)
(or)
(b) What is Use Case Diagram? Demonstrate with example. (CO3, L1)
5. (a) List various resources of Information System. (CO3, L4)
(or)
(b) What is Software Sizing? Explain it (CO5, L1)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10=50 Marks)

6. (a) Explain various types of Software Myths. (CO1, L2)
(or)
(b) Explain Incremental Process Models. (CO1, L2)

7. (a) List (i) Planning Principles(ii) Modelling Principles. (CO2, L4)
(or)
(b) Examine various aspects of Scenario-Based Modelling. (CO1, L4)

8. (a) Develop various test strategies to test Conventional Software. (CO3, L3)
(or)
(b) Develop various strategies for White Box Testing. (CO3, L3)

9. (a) Explain Management Spectrum in detail. (CO6, L5)
(or)
(b) Explain Discuss (i) Size-Oriented Metrics(ii)Function-Oriented Metrics in detail. (CO6, L5)

10. (a) Explain Functional specification of Cleanroom Strategy. (CO5, L5)
(or)
(b) Explain (i) The COCOMO II Model (ii) The Software Equation of Empirical Estimation Models. (CO5, L5)

DATA STRUCTURES LAB

Course Code	:	**22CS2L1**	No. Of Practical Hours per week		:	6
Year of Introduction	:	2022-23	Total No. Of Practical Hours		:	90
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Lab				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Illustrates concepts of Stacks, Queues, and Tree Traversals, Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists, Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFS Algorithm, Searching & Sorting Algorithms, AVL-Trees and B-Trees and its operations and implementations.

Course Objectives:
This course will help enable the students to understand learn, apply / implement the concepts of Stacks, Queues, and Tree Traversals, Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists, Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFS Algorithm, Searching & Sorting Algorithms, AVL-Trees and B-Trees.

Specific Objectives include:
- To understand the concepts of Stacks, Queues, and Tree Traversals.
- To apply the operations of Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists and Operations on Stacks and Queues.
- To apply operations on Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFS Algorithm.
- To implement Searching & Sorting Algorithms.
- To implement AVL-Trees and B-Trees.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Illustrate Data Structures Operations
CO2	Demonstrate Searching& Sorting Algorithms
CO3	Develop Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists and Operations on Stacks and Queues**.**
CO4	Build Binary Search Tree, Binary Search Tree Traversals, Sparse Matrix and DFS & BFS Algorithm.
CO5	Construct AVL-Trees and B-Trees.

Lab Cycle

CYCLE 1
1. Write a Java Program to create a class called Stack and implement Stack Operations. (CO2, L3)
2. Write a Java Program to create a class called Queue and implement Stack Operations. (CO2, L3)
3. Write a Java Program to convert the Infix to Postfix Expression. (CO2, L3)
4. Write a Java Program to evaluate Postfix Expression. (CO2, L1)
5. Write a Java Program to obtain the Binary Number for a given Decimal Number. (CO2, L3)

CYCLE 2
6. Write a Java Class to implement the operations of a Singly Linked List. (CO3, L3)

7. Write a Java Class to implement the operations of a Doubly Linked List. (CO3, L3)
8. Write a Java Class to implement the operations of a Circular Linked List. (CO3, L3)
9. Write a java program for the following a) Reverse a Linked List b) Sort the data in a Linked List c) Remove Duplicates d) Merge Two Linked Lists (CO3, L3)
10. Write a java program for performing various operations on Stack using Linked List. (CO3, L3)
11. Write a java program for performing various operations on Queue using Linked List. (CO3, L3)

CYCLE 3

12. Write a Java Program to implement operations on Binary Trees Using Recursive and Non- Recursive Methods. (CO3, L1)
13. Write a Java Program to perform Binary Search Tree Traversal. (CO3, L3)
14. Write a Java Program to implement Sparse Matrix. (CO3, L3)
15. Write a Java Program to implement DFS Algorithm. (CO3, L3)
16. Write a Java Program to implement BFS Algorithm. (CO3, L3)

CYCLE 4

17. Write a Java Program to implement the following sorting techniques:
18. a. Bubble Sort b. Merge Sort. c. Quick Sort. d. Heap Sort. (CO3, L3)
19. Write a Java Program to implement Quick Sort of given elements. (CO3, L3)
20. Write a Java Program to implement the Following search techniques:
    a. Linear Search b. Binary Search (CO3, L3)

CYCLE 5

21. Write a Java Program to implement various operations on AVL Trees. (CO6, L6)
22. Write a Java Program to perform the following operations: a) Insertion into a B-Tree b) Searching in a B-Tree (CO6, L3)
23. Write a Java Program to implementation of recursive and non-recursive functions to Binary Tree Traversals (CO3, L3)
24. Write a Java Program to implement all the functions of Dictionary (ADT) using Hashing. (CO3, L3)

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.

WEB TECHNOLOGIES LAB

Course Code	**:**	**22CS2L2**	No. Of Practical Hours per week		:	6
Year of Introduction	:	2022-23	Total No. Of Practical Hours		:	90
Year of Offering	:	2022-23	CIA Marks		:	30
Year of Revision	:	2022-23	SEE Marks		:	70
Percentage of Revision	:	0%	Total Marks		:	100
Course Delivery Method	:	Classroom / Blended Mode - Both		Credits	:	3
Course Category	:	Lab				
Type of Course	:	Skill development / Employability / Entrepreneurship				
Course Relate to	:	Local / National / International				

Course Description and Purpose:
Web Technologies Lab (22CS2L2) is a course that illustrates concepts of HTML, Java Script, DHTML, XML, PHP, JSP, Angular JS, Servlet and Git.

Course Objectives:
This course will help enable the students to understand, learn, design Static and Dynamic Web Pages, Create XML Style Sheets, write PHP programs for data retrieval, write JSP Applications for Client-Server Communication, can create Directives, Events, Data Binding and Database Connectivity using Angular JS and Bindings & Events using Svelte and Version Controlling using Git.

Specific Objectives include:
- To build functional web applications using HTML.
- To create Dynamic Web Pages using Java Script and DHTML.
- To create Style Sheets with XML and write PHP Programs for Data Retrieval.
- To create JSP Applications for Client-Server Communication.
- To create Directives, Events, Data binding and Database Connectivity using Angular JS and Bindings & Events using Svelte and Version Controlling using Git.

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

CO1	Illustrate functional web applications using HTML, Bindings & Events using Svelte.
CO2	Demonstrate Style Sheets with XML and DHTML.
CO3	Develop Dynamic Web Pages using Java Script, PHP Programs for Data Retrieval.
CO4	Build JSP Applications for Client-Server Communication.
CO5	Create Directives, Events, Data Binding and Database Connectivity using Angular JS and Version Controlling using Git.

Lab Cycle:

HTML:
1. Write HTML code to provide intra document linking. (CO2, L3)
2. Write HTML code to provide inter document linking. (CO2, L3)
3. Write a program to implement the three types of lists. (CO2, L3)
4. Create a HTML page using frames. (CO2, L3)
5. Write a program to embed college picture into your web page and write a short note on your college using paragraph tag. (CO2, L3)
6. With a suitable example, depict how we can align text using a table tag as follows. (CO2, L3)
7. Write a program to create the timetable as follows: (CO2, L3)
8. Create a registration form that interacts with the user. Collect Login Name, Password, Date of Birth, Sex, Address, Qualification and display a "Thanks for Registering" message when the user submits the form. (CO2, L3)

JAVA SCRIPT:

9. Write a script to compare two strings using String object. (CO3, L3)
10. Write a script to generate random numbers within 1 to 10 and display the numbers in a table. (CO3, L3)
11. Write a Java Script to update the information into the array, in the “onClick” event of the button “Update”. (CO3, L3)
12. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill with the total being added up simultaneously. (CO3, L3)
13. Write a script to find the duplicate elements of an array. (CO3, L3)
14. Write a script which generates a different greeting each time the script is executed. (CO3, L3)
15. Write a JavaScript to check the number is Armstrong number or not by getting the number from textbox and the result is displayed in a alert dialog box. (CO3, L3)
16. Using functions write a java script code that accepts username and password from user, check their correctness and display appropriate alert messages. (CO3, L3)

DHTML:

17. Create an inline style sheet. Illustrate the use of an embedded style sheet. (CO2, L3)
18. Create an external style sheet to illustrate the “Font” elements. (CO2, L3)
19. Write a program to switch on and off light using onClick event. (CO2, L3))
20. Illustrate different types of filters (at least six) on a sample text. (CO2, L3)
21. Write a program to illustrate tabular data control for data binding. (CO2, L3)

XML:

22. Create a small XML file designed to contain information about student performance on a module. Each student has a name, a roll number, a subject mark and an exam mark. (CO2, L3)
23. Create a internal DTD file. (CO2, L3)
24. Create an external DTD file. (CO2, L3)
25. Create a XSLT stylesheet to display the student data as an HTML table. (CO2, L3)

PHP:

26. Calculate the factorial of a given number using PHP declarations and expressions. (CO3, L3)
27. Write a PHP program that interacts with the user. Collect first name last name and date of birth and displays that information back to the user. (CO6, L6)

JSP:

28. Write a program to implement JSP directives. (CO3, L3)
29. Write a JSP program for session tracking. (CO6, L6)

ANGULAR JS:

30. Create Registration and Login Forms with Validations using JScript Query. (CO6, L6)
31. Implement the following in Angular JS (CO6, L6)
    (a) Angular JS Data Binding
    (b) Angular JS Directives and Events
    (c) Using Angular JS to fetch Data from MySQL

SVELTE: Illustrate the following (CO2, L3)

32. Reactivity using SVELTE.
33. Bindings using SVELTE.
34. Transitions using SVELTE.

Git: Illustrate the following (CO6, L6)
Version Control Using Git

Note: The list of experiments is not limited to the above list. If the existing laboratory experiments completed in advance, the additional laboratory programs can added, and to be executed in the laboratory.