G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)

(Re-Accredited with "A" Grade by NAAC)
Department of B.Sc., Computer Science

U23CS505 - SOFTWARE ENGINEERING

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS505	Software Engineering	Core-5	70	5	0	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- software engineering concepts and to create a system model in real life applications
- software engineering life cycle by demonstrating competence in planning ,analysis,design,testing

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Apply software engineering principles and techniques.	K1,K2,K3,K4,K5
CO2	Gain basic knowledge of analysis and design of systems.	K1,K2,K3,K4,K5
CO3	Model a reliable and cost-effective software systems.	K1,K2,K3,K4,K5
CO4	Design an effective model of the system.	K1,K2,K3,K4,K5
CO5	Perform testing at various levels and produce an efficient system.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	**14**	**11**	**11**	**13**	**12**	**13**	**13**	**11**	**9**	**10**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction to Software Engineering   (L-14 hrs; T-2hrs)

Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering.
Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.

Unit – II Requirements Analysis and Specification   (L- 14 hrs)

Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS).
Software Design: Good software design, cohesion and coupling, neat arrangement, software design approaches,

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object- oriented vs function-oriented design.

Unit – III Software Design   **(L-14 hrs)**

Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.
User-Interface design: Characteristics of a good interface, basic concepts, types of user interfaces, component based GUI development, a user interface methodology.

Unit – IV Software Testing   **(L-14 hrs ; T-3 hrs)**

Coding and Testing: Coding, code review, testing, testing in the large vs testing in the small, unit testing, black-box testing, white-box testing, debugging, program analysis tools, integration testing, system testing, some general issues associated with testing.
Software Reliability and Quality Management: Software reliability; statistical testing; software quality, software quality management system, SEI capability maturity model, personal software process.

Unit – V Software Maintenance   **(L- 14 hrs)**

Computer Aided Software Engineering: CASE and its scope, CASE environment, CASE support in software life cycle, other characteristics of CASE tools, towards second generation CASE tool, architecture of a CASE environment.
Software Maintenance: Characteristic of software maintenance, software reverse engineering, software maintenance process models, estimation of maintenance cost.

Text Books

1. Rajib Mall,"Fundamentals of Software Engineering", Fifth Edition, Prentice-Hall of India, 2018.

Reference Books

1. Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997.
2. Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3. James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Web Resources

1. Web resources from NDL Library.
2. E-content from open-source libraries.

Course Designer

Dr.A.Gopi Kannan, Head & Assistant Professor, Department of Computer Science

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U23CS506 - DATABASE MANAGEMENT SYSTEM

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS506	Database Management System	Core-6	70	5	0	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- fundamental concepts of Database Management Systems and their advantages over traditional file systems
- relational database model, integrity constraints, and normalization techniques
- structured Query Language (SQL) for database creation, manipulation, and retrieval
- database design principles and query optimization techniques for efficient data retrieval

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Recall and understand the basic concepts of DBMS, including differences between file system and database systems.	K1,K2,K3,K4,K5
CO2	Define integrity constraints and explain the fundamentals of the relational and entity-relationship models.	K1,K2,K3,K4,K5
CO3	Design database schemas that incorporate normalization and relationships, and construct databases using SQL.	K1,K2,K3,K4,K5
CO4	Classify various SQL functions and join operations to efficiently manage and retrieve data from multiple tables.	K1,K2,K3,K4,K5
CO5	Develop and implement database operations using PL/SQL, including the use of cursors and exception handling.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	**14**	**11**	**11**	**13**	**12**	**13**	**13**	**11**	**9**	**10**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction to Database Management Systems   **(L-14 hrs; T-2 hrs)**

Introduction to DBMS – File system vs DBMS – Advantages of DBMS – Database architecture – Data models – Schema and instances – Data independence – Database languages – Database users and administrators – Data dictionary – Entity-Relationship Model: Entities, attributes, relationships, keys, E-R diagram.

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Unit – II Relational Model and Normalization (L-14 hrs)

Relational Model – Relational Algebra – Relational calculus – Keys and Constraints – Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, and 5NF – Functional dependencies – Multivalued dependencies – Decomposition and lossless join

Unit – III Structured Query Language (SQL) and Transactions (L-14 hrs)

SQL: DDL, DML, DCL, TCL – Table creation, modification, and deletion – Indexes and Views – Nested queries – Joins – Aggregate functions – Grouping and Ordering – PL/SQL: Procedures, Functions, Triggers, Cursors – Transactions: ACID properties – Concurrency control – Locking techniques – Deadlock handling

Unit – IV Storage Management and Query Processing (L-14 hrs; T-3 hrs)

File Organization – Indexing – Hashing techniques – B+ Trees – Query Processing – Query Optimization – Cost estimation – Query execution plan – Performance tuning.

Unit – V Advanced Database Concepts (L-14 hrs)

Distributed databases – NoSQL databases – Data Warehousing – OLAP and OLTP – Big Data and Cloud Databases – Database Security – Role-based access control – Threats and countermeasures.

Text Books

1. Ramez Elmasri and Shamkant B. Navathe, \"Fundamentals of Database Systems\",Pearson Education, 7th Edition, 2016.

Reference Books

1. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, \"Database System Concepts\", McGraw-Hill, 6th Edition, 2010.
2. C. J. Date, \"An Introduction to Database Systems\", Pearson Education, 8th Edition, 2003.

Web Resources

1. https://www.w3schools.com/sql/
2. https://www.geeksforgeeks.org/dbms/

Course Designer

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U23CS5P5 - DATABASE MANAGEMENT SYSTEM LAB

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5P5	Database Management System Lab	Core Lab - 5	0	0	75	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	40	60	100

Course Objective

- An understanding of various SQL and PL/SQL commands
- Knowledge of cursors and their practical applications
- The ability to design and implement database-driven applications
- Hands-on experience in managing and retrieving data using SQL
- The skills to develop triggers, stored procedures, and functions

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understand the basic concepts of Database Systems, differentiate between file systems and DBMS, and compare various data mode	K1,K2,K3,K4,K5
CO2	Define integrity constraints, understand the Relational Data Model, and Entity-Relationship Model.	K1,K2,K3,K4,K5
CO3	Design database schemas considering normalization, relationships, and construct databases using Structured Query Language (SQL).	K1,K2,K3,K4,K5
CO4	Classify different functions and join operations and enhance their knowledge in handling multiple tables.	K1,K2,K3,K4,K5
CO5	Design and implement database operations using PL/SQL, including cursors and exception handling.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	2	3	3	3	2	2	2
CO5	3	2	2	2	3	3	3	2	1	1
Total	**14**	**11**	**11**	**12**	**12**	**14**	**14**	**11**	**9**	**11**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

List of Lab Excercises 75

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I. SQL Commands
1. Execute DDL (Data Definition Language) Commands
2. Execute DML (Data Manipulation Language) Commands
3. Execute TCL (Transaction Control Language) Commands

II. PL/SQL Programming
4. Write a PL/SQL program for Fibonacci Series.
5. Write a PL/SQL program to find the Factorial of a number.
6. Write a PL/SQL program to reverse a string.
7. Write a PL/SQL program to find the sum of a series.
8. Implement Triggers in PL/SQL.

III. Cursors in PL/SQL
9. Develop a program for Student Mark Analysis using Cursors.
IV. Application-Based Programs
10. Develop a Library Management System using SQL and PL/SQL.
11. Implement a Student Mark Analysis System using database concepts.

Text Books

1. Coronel, Morris, Rob, \"Database Systems: Design, Implementation, and Management\", Nineth Edition.

2. Nilesh Shah, \"Database Systems Using Oracle\", 2nd Edition, Pearson Education India, 2016.

Reference Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, \"Database System Concepts\", McGraw Hill, 6th Edition.

2. Shio Kumar Singh, \"Database Systems\", Pearson Publications, 2nd Edition.

3. Albert Lulushi, \"Developing ORACLE FORMS Applications\", Prentice Hall, 1997.

Web Resources

1. NDL Library Resources.

2. Open-source E-content libraries.

Course Designer

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U23CS5E1A - IMAGE PROCESSING

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E1A	Image Processing	Core Elective-1	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- Fundamentals of digital image processing
- Various 2D Image transformations
- Various image enhancement processing methods and filters
- Various classification of Image segmentation techniques
- Various image compression techniques

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Understand the fundamental concepts of digital image processing.	K1,K2,K3,K4,K5
CO2	Understand various 2D Image transformations.	K1,K2,K3,K4,K5
CO3	Understand image enhancement processing techniques and filters.	K1,K2,K3,K4,K5
CO4	Understand the classification of Image segmentation techniques.	K1,K2,K3,K4,K5
CO5	Understand various image compression techniques.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	14	11	11	13	12	13	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Digital Image Fundamentals **(L-12 hrs)**

Image representation - Basic relationship between pixels, Elements of DIP system -Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems - Mathematical Morphology- Structuring Elements-Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method -2D Convolution Through Matrix Analysis

Unit – II 2D Image transforms **(L-12 hrs)**

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Properties of 2D-DFT - Walsh transform - Hadamard transform- Haar transform- Discrete Cosine Transform-Karhunen-Loeve Transform -Singular Value Decomposition.

Unit – III Image Enhancement   **(L-12 hrs)**

Spatial domain methods- Point processing- Intensity transformations - Histogram processing- Spatial filtering-smoothing filter- Sharpening filters - Frequency domain methods: low pass filtering, high pass Filtering-Homomorphic filter.

Unit – V Image Compression   **(L-12 hrs)**

Need for compression -Redundancy- Classification of image- Compression schemes- Huffman coding-Arithmetic coding- Dictionary based compression -Transform based compression.

Unit-IV Image Segmentation   **(L-12 hrs)**

Classification of Image segmentation techniques - Region approach – Clustering techniques - Segmentation based on thresholding - Edge based segmentation - Classification of edges- Edge detection - Hough transform- Active contour.

Text Books

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing, Tata McGraw Hill, 2015
2. Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009

Reference Books

1. Kenneth R Castleman , Digital image processing, Pearson Education,2nd Edition,2003.
2. Pratt William K , Digital Image Processing , John Wiley,4th Edition,2007.

Web Resources

1. https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

Course Designer

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U23CS5E1B - COMPUTATIONAL INTELLIGENCE

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E1B	Computational Intelligence	Core Elective-1	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- basics of AI and its search
- Fuzzy logic systems
- concepts of Neural Network and its functions
- Genetic Algorithm

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	describe the fundamentals of artificial intelligence concepts and searching techniques.	K1,K2,K3,K4,K5
CO2	develop the fuzzy logic sets and membership function and defuzzification techniques.	K1,K2,K3,K4,K5
CO3	understand the concepts of Neural Network and analyze and apply the learning techniques	K1,K2,K3,K4,K5
CO4	understand the artificial neural networks and its applications.	K1,K2,K3,K4,K5
CO5	understand the concept of Genetic Algorithm and optimization problems using GAs.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	14	11	11	13	12	13	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction to AI　　　　　　　　　　　　　　　　　　　　　　(L-12 hrs)

Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.

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Unit – II Fuzzy Logic Systems **(L-12 hrs)**

Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.

Unit – III Neural Networks **(L-12 hrs)**

What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications

Unit – IV Artificial Neural Networks **(L-12 hrs)**

Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.

Unit – V Genetic Algorithm **(L-12 hrs)**

Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm

Text Books

1. S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", 2nd Edition, Wiley India Pvt. Ltd.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Pearson Education in Asia.

Reference Books

1. F. Martin McNeill, Ellen Thro "Fuzzy Logic: A Practical Approach", AP Professional, 2000
2. Chin-Teng Lin, C. S. George Lee, Neuro-Fuzzy Systems, PHI (Prentice-Hall of India).

Web Resources

1. https://www.javatpoint.com/artificial-intelligence-tutorial
2. https://www.w3schools.com/ai/

Course Designer

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U23CS5E1C - CRYPTOGRAPHY

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E1C	Cryptography	Core Elective-1	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- fundamentals of Cryptography
- standard algorithms used to provide confidentiality, integrity and authenticity
- various key distribution and management schemes
- encryption techniques to secure data in transit across data networks

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	analyze the vulnerabilities in computing system and to design a security solution.	K1,K2,K3,K4,K5
CO2	apply the different cryptographic operations of symmetric cryptographic algorithms.	K1,K2,K3,K4,K5
CO3	apply the different cryptographic operations of public key cryptography.	K1,K2,K3,K4,K5
CO4	apply the various Authentication schemes to simulate different applications.	K1,K2,K3,K4,K5
CO5	understand various Security practices and System security standards.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	2	3	2	2	2	3	2	3	2	3
CO4	3	2	3	3	3	2	2	2	2	1
CO5	3	2	3	2	3	3	3	2	1	1
Total	12	11	12	13	12	13	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit - I Introduction (L-12 hrs)

The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.

Unit - II Classical Encryption Techniques (L-12 hrs)

Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography

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Unit - III Block Cipher and DES   **(L-12 hrs)**

Block Cipher Principles – DES – The Strength of DES –RSA: The RSA algorithm.

Unit - IV Network Security Practices   **(L-12 hrs)**

IP Security overview - IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.

Unit – V Network Security Applications and System Security   **(L-12 hrs)**

Intruders – Malicious software – Firewalls-Authentication applications: Kerberos, X.509-Email security: PGP and S/MIME- IP Security (IPSec): architecture, AH, ESP, key management-Web security: HTTPS- Intrusion Detection Systems (IDS)-Virtual Private Networks (VPNs)

Text Books

1. William Stallings, "Cryptography and Network Security Principles and Practices", 8th Edition: September 15, 2020
2. Behrouz A. Forouzan, Cryptography and Network Security, McGraw Hill, SIE Edition: November 13, 2015

Reference Books

1. AtulKahate, "Cryptography and Network Security", Second Edition, 2003, TMH.
2. M.V. Arun Kumar, "Network Security", 2011, First Edition, USP.

Web Resources

1. https://www.tutorialspoint.com/cryptography/
2. https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography

Course Designer

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U23CS5E2A - INTRODUCTION TO DATA SCIENCE

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E2A	Introduction to Data Science	Core Elective-2	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- Basics of Data Science and Big data
- Overview and building process of Data Science
- Various Algorithms in Data Science
- Hadoop Framework

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Understand the basics in Data Science and Big data	K1,K2,K3,K4,K5
CO2	Understand overview and building process in Data Science.	K1,K2,K3,K4,K5
CO3	Understand various Algorithms in Data Science.	K1,K2,K3,K4,K5
CO4	Understand Hadoop Framework in Data Science.	K1,K2,K3,K4,K5
CO5	Case study in Data Science.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	3	3	2	3
CO2	3	3	3	3	2	3	2	3	2	3
CO3	3	3	3	3	3	3	2	3	2	3
CO4	3	2	2	3	3	3	2	2	2	3
CO5	3	2	3	3	3	3	3	3	1	3
Total	15	12	13	15	13	14	12	14	9	15

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction (L-12 hrs)

Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science.

Unit – II Data science process (L-12 hrs)

The Data science process: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building .

Unit – III Algorithms (L-12 hrs)

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Algorithms :Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised

Unit – IV Introduction to Hadoop **(L-12 hrs)**

Introduction to Hadoop :Hadoop framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types.

Unit – V Case Study **(L-12 hrs)**

Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation.

Text Books

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016.

Reference Books

1. Roger Peng, "The Art of Data Science", lulu.com 2016.
2. Lillian Pierson, "Data Science for Dummies", 2nd Edition, 2017.

Web Resources

1. https://www.w3schools.com/datascience.
2. https://en.wikipedia.org/wiki/Data_science.

Course Designer

Dr S.Suganthi ,Assistant Professor, Department of Computer Science

B.Sc., Computer Science

G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)
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Department of B.Sc., Computer Science

U23CS5E2B - BIG DATA ANALYTICS

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E2B	Big Data Analytics	Core Elective-2	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- Big Data Platform and its Use cases, Map Reduce Jobs
- the Association Rules, Recommendation System
- concept of stream
- concepts of NoSQL Databases

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	work with big data tools and its analysis techniques.	K1,K2,K3,K4,K5
CO2	analyze data by utilizing clustering and classification algorithms.	K1,K2,K3,K4,K5
CO3	learn and apply different mining algorithms and recommendation systems for large volumes of data.	K1,K2,K3,K4,K5
CO4	perform analytics on data streams.	K1,K2,K3,K4,K5
CO5	learn NoSQL databases and management.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	3	3	2	2
CO2	3	3	3	3	3	2	2	3	2	2
CO3	3	3	3	3	3	3	2	3	2	2
CO4	3	2	3	3	3	3	2	2	2	3
CO5	3	3	3	3	3	3	3	3	1	3
Total	**15**	**13**	**14**	**15**	**14**	**13**	**12**	**14**	**9**	**12**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction (L-12 hrs)

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model.

Unit – II Classification and clustering (L-12 hrs)

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Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier

Unit – III Advanced Analytical   (L-12 hrs)

Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.

Unit – IV Streams   (L-12hrs)

Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing,
Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

Unit – V Advanced Database Concepts   (L-12 hrs)

NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores-Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding —Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.

Text Books

1. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Reference Books

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013
2. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

Web Resources

1. https://www.geeksforgeeks.org/robotics-introduction/
2. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm

Course Designer

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Department of B.Sc., Computer Science

U23CS5E2C - ROBOTICS AND ITS APPLICATIONS

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5E2C	Robotics and its Applications	Core Elective-2	60	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	25	75	100

Course Objective

- To understand the robotics fundamentals
- Understand the sensors and matrix methods
- Understand the Localization: Self-localizations and mapping
- To learn about the concept of robot artificial intelligence

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Describe the different physical forms of robot architectures.	K1,K2,K3,K4,K5
CO2	Kinematically model simple manipulator and mobile robots	K1,K2,K3,K4,K5
CO3	Mathematically describe a kinematic robot system	K1,K2,K3,K4,K5
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	K1,K2,K3,K4,K5
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	3	3	2	2
CO2	3	3	3	3	3	2	2	3	2	2
CO3	3	3	3	3	3	3	2	3	2	2
CO4	3	2	3	3	3	3	2	2	2	3
CO5	3	3	3	3	3	3	3	3	1	3
Total	15	13	14	15	14	13	12	14	9	12

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit–I Introduction (L-12 hrs)

Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics

Unit–II Actuators and sensors (L-12 hrs)

Actuators and sensors :Types of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-

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strain gauge based force torque sensor-proximity and distance measuring sensors.

Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot.

Unit–III Localization   (L-12 hrs)

Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.

Unit–IV Path Planning   (L-12 hrs)

Path Planning: Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies

Vision system: Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations

Unit–V Application   (L-12 hrs)

Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space Applications-Industrial robots - artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting-assembly operation-cleaning-etc.

Text Books

1. Richared D.Klafter. Thomas Achmielewski and MickaelNegin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001

Reference Books

1. M.P.Groover et.al, "Industrial robotic technology-programming and application" McGrawhill2008
2. S.R.Deb "Robotics technology and flexible automation", THH-2009

Web Resources

1. https://www.geeksforgeeks.org/robotics-introduction/
2. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm

Course Designer

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U23CS5SP - ADVANCED EXCEL LAB

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS5SP	Advanced Excel LAB	Skill Enhancement Course	0	0	30	2

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	V	0	50	50

Course Objective

- Aggregate numeric data and summarize into categories and subcategories
- Filtering, sorting, and grouping data or subsets of data
- Create pivot tables to consolidate data from multiple files
- Presenting data in the form of charts and graphs

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Explain basic concepts of Excel and create/edit spreadsheet.	K1,K2,K3,K4,K5
CO2	Apply basic excel formula in various functional areas of management.	K1,K2,K3,K4,K5
CO3	Demonstrate knowledge in using advanced excel functions.	K1,K2,K3,K4,K5
CO4	Apply logical functions of Excel	K1,K2,K3,K4,K5
CO5	Use online methods to conduct surveys.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	2	2	3	2	3
CO2	2	2	3	2	2	2	1	1	2	2
CO3	2	3	2	3	2	3	1	3	2	3
CO4	1	2	2	2	2	2	2	2	2	1
CO5	1	2	2	2	2	2	2	2	1	1
Total	9	12	12	12	9	11	8	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

List of Exercises   **30**

1. Create and Editing Worksheets by using Excel
2. Creating Excel Sheets with Formula and Functions
3. Create and Save Macros
4. Sorting and Querying Data
5. Calculation of Ratios using Excel
6. Preparation of Sales Transaction Report Using Excel
7. Monthly Expenses Report using Excel

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8. Calculation of Ratios using Excel -2
9. Using basic functions in Excel – Average, Count, Minimum , Maximum
10. Application of Date Function in Ms Excel
11. Use of Sum, Sumif, Count and Count if functions
12. Extracting Data using combined Vlookup and Hlookup
13. Consumer Satisfaction Survey Using Google Forms

Text Books

1. David W. Beskeen, \"Microsoft Office 2013: Illustrated Introductory, First Course, Spiral bound Version\", Cengage Learning, 2013.
2. Bill Jelen and Michael Alexander, Microsoft Excel 2019 Pivot Table Data Crunching, Microsoft Press, 2019.

Reference Books

1. Excel 2019 All-in-One for Dummies, Greg Harvey, 1st edition
2. Introduction to Computers and Communications, Peter Norton-Sixth Edition-Tata McGraw Hill, 2009.
3. Winston-Microsoft Office Excel Data Analysis and Business Modeling, First Edition, Prentice Hall India. 2007

Web Resources

1. https://www.simplilearn.com
2. https://www.javatpoint.com
3. https://trumpexcel.com/learn-excel/
4. https://digital.com/excel-tutorials/

Course Designer

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G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)

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Department of B.Sc., Computer Science

U23CS607 - COMPUTER NETWORKS

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS607	Computer Networks	Core-7	80	10	0	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- concepts of data communication and computer network
- knowledge on routing algorithms
- knowledge about networking and inter networking devices

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understand the basics of Computer Network architecture, OSI and TCP/IP reference models.	K1,K2,K3,K4,K5
CO2	gain knowledge on Telephone systems and Satellite communications.	K1,K2,K3,K4,K5
CO3	impart the concept of Elementary data link protocols.	K1,K2,K3,K4,K5
CO4	analyze the characteristics of Routing and Congestion control algorithms.	K1,K2,K3,K4,K5
CO5	understand network security and define various protocols such as FTP, HTTP, Telnet.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	3	2
CO3	3	3	3	2	2	3	3	3	2	3
CO4	2	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	**13**	**11**	**11**	**13**	**12**	**13**	**14**	**11**	**10**	**10**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Introduction to Computer Networks   (L-16 hrs; T-3hrs)

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media.

Unit – II Communication   (L- 16 hrs)

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

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Unit – III Protocols   **(L-16 hrs)**

Elementary Data Link Protocols-Sliding Window protocols-Data Link Layer in the internet- Medium Access layer- Channel Allocation Problem –Multiple Access Protocols-Bluetooth

Unit – IV Routing Algorithm   **(L-16 hrs ; T-3 hrs)**

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

Unit – V Transport Layer   **(L- 16 hrs; T-4 hrs)**

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography.Software Maintenance: Characteristic of software maintenance, software reverse engineering, software maintenance process models, estimation of maintenance cost.

Text Books

1. A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

Reference Books

1. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017.
2. F. Halsall, "Data Communications,Computer Networks and Open Systems", Pearson Education, 2008.
3. D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.
4. Lamarca, "Communication Networks", Tata McGraw- Hill, 2002.

Web Resources

1. Web resources from NDL Library.
2. E-content from open-source libraries.

Course Designer

Dr.A.Gopi Kannan, Head & Assistant Professor , Department of Computer Science

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U23CS608 - .NET PROGRAMMING

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS608	.NET Programming	Core-8	80	10	0	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- goals and objectives of the dot NET Framework and ASP dot NET with C# language
- development of ASP dot NET web applications using standard controls
- implementation of file handling operations
- handling SQL Server Database using ADO dot NET
- understanding the Grid View control and XML classes

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	develop working knowledge of C# programming constructs and the .NET Framework.	K1,K2,K3,K4,K5
CO2	develop software to solve real-world problems using ASP.NET.	K1,K2,K3,K4,K5
CO3	work on various control files and implement file handling operations.	K1,K2,K3,K4,K5
CO4	create a web application using Microsoft ADO.NET.	K1,K2,K3,K4,K5
CO5	develop web applications using XML	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	2	3
CO2	2	2	2	1	2	2	2	1	2	2
CO3	3	2	2	3	2	3	1	3	2	3
CO4	1	2	1	2	2	2	3	2	2	1
CO5	1	1	2	2	2	2	2	2	1	1
Total	10	9	9	11	9	11	10	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit- I: Overview of .NET Framework   (L – 16 hrs, T-2 hrs)

Overview: Review of .NET fundamentals – History of .NET – .NET buzz words – Common Language Runtime (CLR) architecture – Data Types in C# – Variables with scope and lifetime – Arrays – Operators – Control Statements – Type Conversion and Casting – Simple C# Program – Constructors – Methods – Static Constructors, Static Data & Static Methods – String and StringBuilder Class

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Unit- II: ASP.NET Web Forms   (L – 16 hrs, T-2 hrs)

ASP.NET Web Forms: Basic Concepts – Page Life Cycle – Server Controls and HTML Controls – Standard Web Controls: Properties and Events – State Management (ViewState, Session) – Code-Behind Model – Master Pages and Themes – Introduction to Event Handling.

Unit- III: Rich Controls and File Handling   (L – 16 hrs; T – 4 hrs)

Rich Controls and File Handling: Overview of Rich Controls – Validation Controls: Properties and Events – FileStream Class – File Modes and File Share – Reading from and Writing to Files – Operations: Creating, Moving, Copying, Deleting Files – File Uploading.

Unit- IV: ADO.NET and Data Access   (L – 16 hrs)

ADO.NET: Introduction to ADO.NET – Establishing Database Connections – Command Objects – DataReader and DataAdapter – DataSet – Data Binding Techniques – Data Controls and Their Properties – Managing Transactions and Error Handling.

Unit- V: GridView and XML Processing   (L – 16 hrs; T – 2 hrs)

GridView and XML Processing: GridView Control – Editing, Sorting, Paging, and Deleting Data – XML Classes – Reading and Writing XML Files – Data Binding with XML – Website Security: Authentication & Authorization – Developing a Complete Web Application.

Text Books

1. Svetlin Nakov, Veselin Kolev & Co., Fundamentals of Computer Programming with C#, Faber Publication, 2019.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Reference Books

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpress, 2013.
3. Anne Boehm & Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc., 2016.
4. Denielle Otey & Michael Otey, ADO.NET: The Complete Reference, McGraw-Hill, 2008
5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.

Web Resources

1. Introduction to .NET Framework – GeeksforGeeks
2. ASP.NET Tutorials – JavaTpoint
3. Microsoft ASP.NET Documentation

Course Designer

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G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)

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U23CS6P6 - .NET PROGRAMMING LAB

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6P6	.NET Programming Lab	Core Lab - 6	0	0	90	4

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	40	60	100

Course Objective

- An understanding of how to develop ASP dot NET web applications using standard controls
- The ability to create rich database applications using ADO dot NET
- Practical skills in implementing file handling operations
- Knowledge in implementing XML classes for data manipulation
- The skills to utilize ASP dot NET security features for authenticating web applications

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Create web applications and implement various ASP.NET controls.	K1,K2,K3,K4,K5
CO2	Develop web pages using rich controls.	K1,K2,K3,K4,K5
CO3	Implement file handling operations effectively.	K1,K2,K3,K4,K5
CO4	Design and implement XML classes in a web environment.	K1,K2,K3,K4,K5
CO5	Develop software solutions to real-world problems using ASP.NET.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	3	2	2	2	2	2	1	2	2
CO3	3	3	3	3	2	3	3	3	2	2
CO4	3	2	2	3	3	2	2	2	2	2
CO5	3	2	2	2	3	3	3	2	1	1
Total	14	12	11	13	12	13	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

List of Lab Exercises 90

I. Exposure and Fundamentals
1. Create an exposure of web applications and the associated tools.
II. Web Controls Implementation
2. Implement the HTML Controls.
3. Implement the Server Controls.
4. Develop a web application using various Web Controls.

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5. Develop a web application using List Controls.
III. Rich Controls and Validation
6. Design a web page using Rich Controls; validate user input using Validation Controls; work with file handling concepts.
IV. Data Controls and Binding
7. Develop a web application using Data Controls.
8. Implement data binding with Web Controls.
9. Implement data binding with Data Controls.
V. Database Application Development
10. Develop a database application to perform insert, update, and delete operations.
11. Develop a database application using Data Controls to perform insert, delete, edit, paging, and sorting operations.
VI. XML and Security Implementation
12. Implement XML classes.
13. Implement Authentication and Authorization.
VII. Application Projects
14. Develop a ticket reservation system using ASP.NET Controls.
15. Develop an online examination system using ASP.NET Controls.

Text Books

1. Svetlin Nakov, Veselin Kolev & Co., Fundamentals of Computer Programming with C#, Faber Publication, 2019.

2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Reference Books

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.

2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpress, 2013.

3. Anne Boehm & Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc., 2016.

4. Denielle Otey & Michael Otey, ADO.NET: The Complete Reference, McGraw-Hill, 2008.

5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.

Web Resources

1. Introduction to .NET Framework – GeeksforGeeks

2. .NET Framework Overview – JavaTpoint

Course Designer

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G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)
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Department of B.Sc., Computer Science

U23CS6E3A - CLOUD COMPUTING

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E3A	Cloud Computing	Core Elective-3	70	5	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- fundamental concepts and technologies of Cloud Computing
- learning various cloud service types and their uses and pitfalls
- cloud architecture and application design
- various aspects of application design, benchmarking and security on the Cloud
- various Case Studies in Cloud Computing

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	analyze various cloud service types (IaaS, PaaS, SaaS) and evaluate their uses, benefits, and potential pitfalls in real-world applications.	K1,K2,K3,K4,K5
CO2	demonstrate an understanding of the fundamental concepts and technologies in cloud computing, including key characteristics, deployment models, and service models.	K1,K2,K3,K4,K5
CO3	design and architect cloud-based applications, considering scalability, reliability, and performance, while applying best practices in cloud architecture.	K1,K2,K3,K4,K5
CO4	implement application design principles, perform benchmarking, and ensure security in cloud environments, addressing data protection, compliance, and risk management.	K1,K2,K3,K4,K5
CO5	evaluate and interpret case studies in cloud computing to identify successful implementations, challenges faced, and lessons learned in diverse industry scenarios.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	3	3	2	3
CO2	3	3	2	3	3	2	3	1	2	2
CO3	3	3	3	3	3	2	2	3	2	3
CO4	3	3	2	3	3	2	2	2	2	1
CO5	3	3	2	3	3	2	3	2	1	1
Total	**15**	**14**	**11**	**15**	**15**	**10**	**13**	**11**	**9**	**10**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

B.Sc., Computer Science

Unit-I Introduction to Cloud Computing   **(L-14 hrs + T-3 hrs)**

Introduction to Cloud Computing: Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing.

Unit-II Cloud Services   **(L-14 hrs)**

Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services - Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service
Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notifiction Services - Media Services

Unit-III Design Consideration   **(L-14 hrs)**

Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).

Unit-IV Cloud Application   **(L-14 hrs)**

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.

Unit-V Cloud Security   **(L-14 hrs + T-2 hrs)**

Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data atrest, securing data in motion – Key Management – Auditing

Text Books

1. ArshdeepBahga, Vijay Madisetti, "Cloud Computing – A Hands On Approach", Universities Press (India) Pvt. Ltd., 2018.

Reference Books

1. Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw-Hill, 2013.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
3. David Crookes, Cloud Computing in Easy Steps, Tata McGraw Hill, 2015.
4. Dr. Kumar Saurabh, Cloud Computing, Wiley India, Second Edition 2012.

Web Resources

1. https://en.wikipedia.org/wiki/Cloud_computing
2. https://webobjects.cdw.com/webobjects/media/.
3. https://cloud.google.com/

Course Designer

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B.Sc., Computer Science

G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)

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Department of B.Sc., Computer Science

U23CS6E3B - FUZZY LOGIC

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E3B	Fuzzy Logic	Core Elective-3	70	5	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- fundamental concepts such as fuzzy sets, operations, and fuzzy relations
- fuzzification of scalar variables and the defuzzification of membership functions
- three different inference methods to design a fuzzy rule-based system
- develop fuzzy decision making by introducing some concepts and also Bayesian decision methods
- learn different fuzzy classification methods

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understand the fundamental concept of Fuzzy logic	K1,K2,K3,K4,K5
CO2	analyze and perform various operations on relation properties	K1,K2,K3,K4,K5
CO3	study and design about the membership functions	K1,K2,K3,K4,K5
CO4	learn and apply the Defuzzification and Fuzzy Rule-Based System	K1,K2,K3,K4,K5
CO5	explore and learn the real-world Applications of Fuzzy Logic	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	3	3	2	3	2	2	3	1	2	2
CO3	3	3	3	3	2	2	2	3	2	3
CO4	3	3	2	3	2	2	2	2	2	1
CO5	3	3	2	2	3	2	3	2	1	1
Total	15	14	11	14	11	11	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit I Introduction to Fuzzy Logic   **(L-14 hrs)**

Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.

Unit II Fuzzy operations   **(L-14 hrs + T-3hrs)**

Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and

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Composition-Tolerance and Equivalence Relations, Crisp Relation.

Unit III Membership Functions   **(L-14 hrs)**

Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.

Unit IV Defuzzification   **(L-14 hrs)**

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.

Unit V Applications of Fuzzy Logic   **(L-14 hrs + T-2 hrs)**

Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.

Text Books

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa-"Introduction to Fuzzy Logic using MATLAB", Springer- Verlag Berlin Heidelberg 2007.

Reference Books

1. Guanrong Chen and Trung Tat Pham-" Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems".
2. Timothy J Ross , "Fuzzy Logic with Engineering Application"s.

Web Resources

1. https://www.javatpoint.com/fuzzy-logic
2. https://www.guru99.com/what-is-fuzzy-logic.html

Course Designer

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Department of B.Sc., Computer Science

U23CS6E3C - NATURAL LANGUAGE PROCESSING

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E3C	Natural Language Processing	Core Elective-3	70	5	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- approaches, syntax and semantics in NLP
- natural language processing and to learn how to apply basic algorithms in this field
- approaches to discourse, generation, dialogue and summarization within NLP
- algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics
- current methods for statistical approaches to machine translation

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understand the fundamental concept and techniques of natural language processing.	K1,K2,K3,K4,K5
CO2	analyze NLP technologies to explore and gain a broad understanding of text data.	K1,K2,K3,K4,K5
CO3	study and design NLP methods to analyze the sentiment of a text document.	K1,K2,K3,K4,K5
CO4	analyzes large volume text data generated from a range of real-world applications.	K1,K2,K3,K4,K5
CO5	explore the framework in which artificial intelligence and the Internet of Things may function, including interactions with people, enterprise functions, and environments.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	2	3	3	1	2	2
CO3	3	3	3	3	3	3	2	3	2	2
CO4	3	2	3	3	2	3	2	2	2	1
CO5	3	3	3	3	3	3	3	2	1	1
Total	**15**	**14**	**15**	**15**	**13**	**15**	**13**	**11**	**9**	**9**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit-I Introduction   **(L-14 hrs)**

Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models –

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Estimating parameters and smoothing – Evaluating language models.

Unit-II Word Level and Syntactic Analysis   **(L-14 hrs + T-2hrs)**

Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.

Unit-III Semantic analysis and Discourse Processing   **(L-14 hrs)**

Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.

Unit-IV Natural Language Generation: **(L-14 hrs + T-3hrs)**

Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches- Translation involving Indian Languages.

Unit-V Information retrieval and lexical resources: **(L-14 hrs)**

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: WorldNet-Frame NetStemmers- POS Tagger- Research Corpora SSAS.

Text Books

1. Daniel Jurafsky, James H. Martin, "Speech & language processing", Pearson publications.
2. Allen, James. Natural language understanding. Pearson, 1995.

Reference Books

1. Pierre M. Nugues, "An Introduction to Language Processing with Perl and Prolog",Springer

Web Resources

1. https://en.wikipedia.org/wiki/Natural_language_processing
2. https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP

Course Designer

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B.Sc., Computer Science

U23CS6E4A - ARTIFICIAL NEURAL NETWORK

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E4A	Artificial Neural Network	Core Elective -4	65	10	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks
- understand the Error Correction and various learning algorithms and tasks
- identify the various Single Layer Perception Learning Algorithm
- identify the various Multi-Layer Perception Network
- analyze the Deep Learning of various Neural network and its Applications

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks.	K1,K2,K3,K4,K5
CO2	understand the Error Correction and various learning algorithms and tasks.	K1,K2,K3,K4,K5
CO3	identify the various Single Layer Perception Learning Algorithm.	K1,K2,K3,K4,K5
CO4	identify the various Multi-Layer Perception Network.	K1,K2,K3,K4,K5
CO5	analyze the Deep Learning of various Neural network and its Applications.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	14	11	11	13	12	13	13	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit - I Introduction   (L-15 Hrs)

Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.

Unit - II Learning Algorithm   (L-15 Hrs)

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Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.

Unit - III Layers (L-12 Hrs +T-3 Hrs)

Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.

Unit - IV Multi-Layer Perception Networks (L-12 Hrs + T-3 Hrs)

Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm.

Unit - V Deep learning (L-11 Hrs +T-4 Hrs)

Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzman Machines, Training of DNN and Applications

Text Books

1. Satish Kumar, "Neural Networks A Classroom Approach"- McGraw Hill- Second Edition.
2. Simon Haykins, "Neural Network- A Comprehensive Foundation" Pearson Prentice Hall, 2nd Edition, 1999.

Reference Books

1. B. Yegnanarayana, Artificial Neural Networks- PHI, New Delhi 1998.

Web Resources

1. https://www.w3schools.com/ai/ai_neural_networks.asp
2. https://en.wikipedia.org/wiki/Artificial_neural_network
3. https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12

Course Designer

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Department of B.Sc., Computer Science

U23CS6E4B - AGILE PROJECT MANAGEMENT

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E4B	Agile Project Management	Core Elective -4	65	10	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- software design, software technologies and APIs
- detailed demonstration about Agile development and testing techniques
- agile Planning and Execution
- agile Management Design and Quality Check
- detailed examination of Agile development and testing techniques

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understanding of software design, software technologies and APIs using Agile Management.	K1,K2,K3,K4,K5
CO2	understanding of Agile development and testing techniques.	K1,K2,K3,K4,K5
CO3	understanding about Agile Planning and Execution using Sprint.	K1,K2,K3,K4,K5
CO4	understanding of Agile Management Design, scope, Procurement, managing Time and Cost and Quality Check.	K1,K2,K3,K4,K5
CO5	analysing of Agile development and testing techniques.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	3	3	2	3
CO2	3	3	2	3	3	2	3	2	3	3
CO3	2	2	3	3	3	3	2	3	3	2
CO4	3	3	2	3	3	3	3	2	3	2
CO5	3	2	3	2	2	3	3	3	2	3
Total	**14**	**12**	**13**	**14**	**13**	**14**	**14**	**13**	**13**	**13**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit - I Introduction
(L-15 Hrs)

Introduction: Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management.Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test.Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.

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Unit - II Agile Approaches (L-15 Hrs)

Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming – Summary.Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools. Agile Behaviors in Action: Establishing Agile roles – Establishing new values – Changing team philosophy.

Unit - III Product Vision (L-12 Hrs +T-3 Hrs)

Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog.Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning.Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective.

Unit - IV Managing Scope (L-12 Hrs + T – 3 Hrs)

Managing Scope and Procurement: What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement. Managing Time and Cost: What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management – Managing Agile budgets.
Managing Team Dynamics and Communication: What's different about Agile team dynamics – Managing Agile team dynamics – What's different about Agile communication – Managing Agile communication. Managing Quality and Risk: What's different about Agile quality – Managing Agile quality – What's different about Agile risk management – Managing Agile risk.

Unit - V Building a Foundation (L-11 Hrs +T-4 Hrs)

Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating and environment that enables Agility – Support Agility initially and over time.Being a Change Agent: Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls – Signs your changes are slipping. Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.

Text Books

1. Dummies, Mark C. Layton, Steven J. Ostermiller,"Agile Project Management for 2nd Edition", Wiley India Pvt. Ltd., 2018.
2. Jeff Sutherland, Scrum, "The Art of Doing Twice the Work in Half the Time", Penguin, 2014.

Reference Books

1. Mark C. Layton, David Morrow, Scrum for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.
2. Mike Cohn, Succeeding with Agile – Software Development using Scrum, Addison-Wesley Signature Series, 2010.

Web Resources

1. www.agilealliance.org/resources

Course Designer

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G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)

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Department of B.Sc., Computer Science

U23CS6E4C - VIRTUAL REALITY

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6E4C	Virtual Reality	Core Elective -4	65	10	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	25	75	100

Course Objective

- knowledge on basic principles of virtual & augmented reality
- ability to use its technology as a platform for real-world applications

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	outline the basic terminologies, techniques and applications of VR and AR	K1,K2,K3,K4,K5
CO2	describe different architectures and principles of VR and AR systems	K1,K2,K3,K4,K5
CO3	use suitable hardware and software technologies for different varieties of virtual and augmented reality applications	K1,K2,K3,K4,K5
CO4	analyze and explain the behavior of VR and AR technology relates to human Perception and cognition	K1,K2,K3,K4,K5
CO5	assess the importance of VR/AR content and interactions to implement for the real- world problem	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	3	3	2	3
CO2	2	2	2	3	2	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	2	3
CO4	3	2	2	3	3	2	2	2	2	1
CO5	3	2	2	2	3	3	3	2	1	1
Total	**14**	**11**	**11**	**13**	**12**	**13**	**13**	**11**	**9**	**10**

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit - I Introduction (L-15 Hrs)

Virtual Reality: The Three I's of VR – History – Early commercial VR Technology – Components of a VR System –Input Devices: Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces

Unit - II Output Devices (L-15 Hrs)

Output Devices: Graphics Displays – Sound Displays – Haptic Feedback - Computer Architecture for VR: The Rendering Pipeline- PC Graphics Architecture - VR Programming: Toolkits and Scene Graphs – Traditional and Emerging Applications of VR

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Unit - III Augmented Reality **(L-12 Hrs +T-3 Hrs)**

Augmented Reality: Introduction – Augmented Reality Concepts: Working Principle of AR –Concepts related to AR- Ingredients of an Augmented Reality Experience.

Unit - IV Augmented Reality Hardware **(L-12 Hrs + T-3 Hrs)**

Augmented Reality Hardware– Augmented Reality Software – Software to create content for AR Application – Tools and Technologies.

Unit - V Augmented Reality Content **(L-11 Hrs +T-4 Hrs)**

Augmented Reality Content: Introduction- Creating Content for Visual, Audio, and other senses – Interaction in AR - Mobile Augmented Reality: Introduction – Augmented Reality Applications Areas- Collaborative Augmented Reality.

Text Books

1. Grigore C. Burdea and Philippe Coiffet, "Virtual Reality Technology", Wiley Student Edition , Second Edition.
2. Alan B. Craig "Understanding Augmented Reality: Concepts and Applications" 2013.

Reference Books

1. Alan Craig & William R. Sherman & Jeffrey D. Will, Morgan Kaufmann, "Developing Virtual Reality Applications: Foundations of Effective Design", Elsevier (Morgan Kaufmann Publishers) 2009.
2. Bruno Arnaldi & Pascal Guitton & Guillaume Moreau, "Virtual Reality and Augmented Reality: Myths and Realities", Wiley 2018.
3. Wiley Paul Mealy, "Virtual and Augmented Reality", 2018.

Web Resources

1. http://msl.cs.uiuc.edu/vr/
2. http://www.britannica.com/technology/virtual-reality/Living-in -virtual-worlds
3. https://mobidev.biz/blog/augmented-reality-development-guide

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Department of B.Sc., Computer Science

U23CS6S5 - QUANTITATIVE APTITUDE

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6S5	Quantitative Aptitude	Core-10	30	0	0	2

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	0	50	50

Course Objective

- basic concepts of numbers
- concept of percentage, profit & loss
- basic concepts of time and work, interests
- concepts of permutation, probability, discounts

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	understand the concepts, application and the problems of numbers.	K1,K2,K3,K4,K5
CO2	have basic knowledge and understanding about percentage, profit & loss related processing.	K1,K2,K3,K4,K5
CO3	understand the concepts of time and work.	K1,K2,K3,K4,K5
CO4	speaks about the concepts of probability, discount.	K1,K2,K3,K4,K5
CO5	understanding the concept of problem solving involved in stocks & shares, graphs.	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	3	3	2	3
CO2	3	3	3	3	2	3	2	3	2	3
CO3	3	3	3	3	3	3	2	3	2	3
CO4	3	2	2	3	3	3	2	2	2	3
CO5	3	2	3	3	3	3	3	3	1	3
Total	15	12	13	15	13	14	12	14	9	15

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit - I Numbers (L-6 Hrs)

Numbers-HCF and LCM of numbers-Decimal fractions-Simplification-Square root and cube roots - Average-problems on Numbers.

Unit - II Problems on Ages (L-6 Hrs)

Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Chain rule.

B.Sc., Computer Science

Unit - III Time and work (L-6 Hrs)

Time and work - pipes and cisterns - Time and Distance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms - Area-Volume and surface area -races and Games of skill.

Unit - IV Permutation and combination (L-6 Hrs)

Permutation and combination-probability-True Discount-Bankers Discount – Height and Distances-Odd man out & Series.

Unit - V Calendar and clock (L-6 Hrs)

Calendar - Clocks - stocks and shares - Data representation - Tabulation – Bar Graphs- Pie charts-Line graphs.

Text Books

1. R.S.AGGARWAL S.Chand "Quantitative Aptitude",S.Chand&CompanyLtd.

Web Resources

1. https://www.javatpoint.com/aptitude/quantitative
2. https://www.toppr.com/guides/quantitative-aptitude/

Course Designer

Mrs.C.Iswarya,Assistant Professor, Department of Computer Science

G.VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS)
(Re-Accredited with "A" Grade by NAAC)
Department of B.Sc., Computer Science

U23CS6OE - MS OFFICE

Course Code	Course Title	Category	Lecture	Tutorial	Practical	Credit
U23CS6OE	MS Office	Part - IV	0	0	0	3

Year	Semester	Internal Marks (CIA)	External Marks (ESE)	Total Marks
III	VI	0	100	100

Course Objective

- Office Automation enhances and upgrade the existing system by increasing its efficiency and effectiveness
- It will simplify the task and reduce the paper work which means the software improves the working methods by replacing the existing manual system with the computer-based system

Course Outcomes (COs)

On the completion of the course the student will be able to

CO	Course Outcome	Knowledge Level (RBT)
CO1	Understand the computer software and hardware	K1,K2,K3,K4,K5
CO2	Make available to simplify and automate a variety of office operations such as data processing, data manipulating and data presentation with various application those are presents in Microsoft office tools packages.	K1,K2,K3,K4,K5
CO3	Familiarize the students in preparation of documents and presentations with office automation tools.	K1,K2,K3,K4,K5
CO4	To identify word processing terminology and concepts, create technical documents, format and edit documents, use simple tools and utilities, and print documents.	K1,K2,K3,K4,K5
CO5	Familiarize the students to use MS Access database	K1,K2,K3,K4,K5

K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create

CO-PO and CO-PSO Mapping (Course Articulation Matrix)

COs	POs							PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	2	2	3	2	3
CO2	2	2	2	2	3	1	2	1	2	2
CO3	2	2	2	2	2	2	2	3	2	3
CO4	3	3	3	2	2	2	1	2	2	1
CO5	2	2	3	3	3	2	2	2	1	1
Total	11	11	13	11	13	9	9	11	9	10

(3-Strong, 2-Medium, 1-Low, -No Correlation)

Course Content

Unit – I Microsoft word   (0 Hrs)

Word processor Basics – Opening Microsoft Word – Closing the Document and Quitting Word – Starting Microsoft Word XP - Introduction to word – Saving the Document – Previewing – Printing – Closing – Changing the size of a document. Editing the Document: Opening an existing word document – Moving the cursor – Making changes in your document – Undoing any operation – Saving changes made to the Document – Checking Spelling in the Document – Automatic correction of errors – Printing the file – Saving and Closing the Document.

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Unit – II Designing your Document (0 Hrs)

Designing your Document: Creating a well formatted Document – Setting the Left , Right , Top and Bottom Margins – Setting page Numbers on your Document – Specifying text at the top and the Bottom of each page. Creating Tables : Selecting Text using the mouse – Inserting Rows – Inserting Columns – Deleting a Row – Deleting a Column .

Unit – III Microsoft Excel (0 Hrs)

Introduction to Spreadsheets – Use of Spreadsheet – Spreadsheet Basics – Formatting a Spreadsheet – Graphs – Functions of Microsoft Excel – Starting Microsoft Excel – Excel Work Environment – Changing size of a Work book and Excel Window .

Unit – IV Cell and Cell Address (0 Hrs)

Standard Toolbar – Formatting toolbar – the Formula bar – Status bar – Components of an Excel Workbook. Working in Excel : Entering data in cell address – Making changes to an entry – Mathematical Calculations – Formulas using numbers – Formula using Cell address – Defining functions simple Graphs.

Unit – V Powerpoint (0 Hrs)

Microsoft Powerpoint: Starting Powerpoint – Creating a presentation – Saving a Presentation – working with views – Adding Graphics, Charts and Tables – Masters – Using Slide Transition- Printing – Closing the Slides – Quitting Microsoft Powerpoint.

Text Books

1. VIKAS GUPTA, "Comdex Computer Course Kit (XP Edition)", Dreametech press, New Delhi.

Reference Books

1. Stephen L. Nelson, "The Complete Reference office 2000" Tata McGraw – Hill Publishing Company limited, New Delhi.
2. N.Krishnan, "Window and MS Office 2000 with Database Concepts" Scitech publications (India) Pvt Ltd., Chennai

Course Designer

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