Board of Studies Meeting
Department of Computer Science

The minutes of the 18th meeting of Board of Studies held on 07.11.2024 at 10.00 a.m. in AvvaiArangam.

Members Present:

S. No.	Name	Category
1	Dr. S. Uma	Chairman
2	Dr. D. Ramya Chitra	VC Nominee
3	Dr. Chandra Blessie E	Subject Expert
4	Dr. Radhika N	Subject Expert
5	Ms. V. Divya Bharathi	Alumni
6	Dr. N. Kuppuchamy, Dept. of Tamil	Co-Opted Member
7	Dr.A.HazelVerbina, Dept. of English	Co-Opted Member
8	Dr. R. Sowrirajan, Dept. of Mathematics	Co-Opted Member
9	Dr. Angeline Prasanna G, Professor	Member
10	Dr. M. Sangeetha, Professor	Member
11	Dr. B. Sivaranjani, Professor	Member
12	Dr. S. Omprakash, Associate Professor	Member
13	Dr. P. Usha, Associate Professor	Member
14	Dr. R. Kalaivani, Associate Professor	Member
15	Mr. V.S. Jagadeeswaran, Assistant Professor (SG)	Member
16	Mr. N. Kumar, Assistant Professor (SG)	Member
17	Dr. S. Maheshwari, Assistant Professor	Member
18	Ms. V. Bakyalakshmi, Assistant Professor	Member
19	Mrs. V. Revathi, Assistant Professor	Member
20	Dr. R. Kavitha, Assistant Professor	Member
21	Mrs. K. R. Prabha, Assistant Professor	Member
22	Ms. S. Priyadharshini, Assistant Professor	Member
23	Mr. B. Justin Sam Ebinezar, III B.Sc. CS 'A'	Student Member
24	Mr. B. Aravindhan, II M.Sc. CS	Student Member

The HoD and Chairman of the Department of Computer Science welcomed and introduced all the members and appreciated them for their continuous support, contribution for the development of academic standard and enrichment of the syllabus.

Further Chairman informed the inability of the following members to attend the meeting and requested to grant leave of absence.

1. Mr. Kousik Rajendran (Industrial Expert)
2. Mrs. S. R. Kalaiselvi (Member)

The items of the agenda were taken one by one for discussion and the following resolutions were passed.

Item 18.1: *To review and approve the minutes of the previous meeting held on 01.04.2024.*

The chairman of the Board presented the minutes of the previous meeting held on 01.04.2024and requested the members to approve. After a brief discussion, the following resolution was passed.

Resolution:

Resolved to approve the minutes of the previous meeting held on 01.04.2024.

Item 18.2:*To consider and approve the Syllabi for the II Semester for the students admitted in UG and PG during the academic year 2024-25.*

The Chairman presented the detailed syllabus for II semester for the students admitted during the academic year 2024-2025. *The members deliberated in detail and approved the syllabus with the following changes.*

Changes Made:

M.Sc. Computer Science:

Course Code	Course	Change and Reason
24CSP2CA	Core V: Advanced Python Programming	Dr. Chandra Blessie suggested to include Keros in Unit IV and Tensor Flow in Unit V to enhance practical machine learning skills.
24CSP2CP	Core Practical III: Advanced Python Programming	Dr. Chandra Blessie suggestedto include programs using Keros and Tensor Flow since they provide hands-on experience with industry-standard tools for building and deploying machine learning models.
24CSP2CB and 24CSP2CQ	Core VI: Advanced Relational Database Management Systems	The board suggested to rename course title as "Modern DatabaseManagement Systems"to reflect its coverage of NoSQL databases.
24CSP2DA	DSE II: Deep Learning	Dr.Ramya Chitra suggested including basic Deep Learning concepts in Unit I to provide a foundational understanding of neural networks and prepare for more advanced topics in machine learning.
24CSP2DB	DSE II: Predictive Analytics	Dr. Chandra Blessie E suggested including Time Series Modeling and Forecasting in Unit V to enable the prediction of future values in time-dependent problems, thereby developing expertise in real-world dynamic data prediction tasks.

24CSP2DC	DSE II: Advanced Networks	Dr. Radhika suggested to include Networking Sensors in Unit II and Software Defined Networking (SDN) in Unit III to address the need for real-time control of dynamic, data-intensive networks and enable flexible IoT-integrated architectures.

IDC Offered

Course Code	Course	Department
24CSU2IC	IDC II : SMART BANKING TECHNOLOGIES	B.Com B & I

After discussion the following resolution was passed with the above changes and modifications

Resolution:

Resolved to approve the syllabus with the modifications adopted for the students admitted in UG and PG during the academic year 2024-2025.

Item 18.3: *To consider and approve the Syllabi for the IV Semester for the students admitted in UG and PG during the academic year 2023-2024.*

The Chairman presented the detailed syllabus for IV Semester for the students admitted during the academic year 2023-2024. *The members deliberated in detail and approved the syllabus with the following changes.*

Changes Made:

B.Sc Computer Science:

Course Code	Course	Change and Reason
234CS1A4SP	SEC Practical II - Linux	Dr. Ramya Chitra suggested replacing directory commands with more Shell Scripts as they enable more complex tasks such as text processing, data filtering and file system management.

IDC Offered

Course Code	Course	Department
234CS1A4IC	IDC IV : SMART BANKING TECHNOLOGIES	B.Com CA
234CS1A4ID	IDC IV : PYTHON FOR BIOLOGISTS	Biochemistry

After the discussion the following resolution was passed with the above changes and modifications.

Resolution:

Resolved to approve the Syllabi for the IV Semester for the students admitted in UG and PG during the academic year 2023-2024.

Item 18.4: *To consider and approve the Syllabi for the VI Semester for students admitted in UG during the academic year 2022-23.*

The Chairman presented the detailed syllabus for VI semester for the students admitted during the academic year 2022-2023. *The members deliberated in detail and approved the syllabus with the following changes.*

New Courses Introduced

B.Sc. Computer Science:

Course Code	Course	Change and Reason
224CS1A6CA	Core XII: Data Visualization	To emphasize modern visualization tools and platforms that help in effectively interpreting and communicating complex data insights using cutting-edge technologies.
224CS1A6CP	Core Practical VII: Data Visualization	To provide hands-on skills in various visualization tools and techniques for data analysis, enabling presentation of data-driven insights effectively.
224CS1A6SP	SEC-IV: R Programming	To provide practical knowledge of data analysis using R, for developing the skills to analyze, visualize and interpret data effectively in various real-world scenarios.
224CS1A6DA	DSE II: Machine Learning	To provide a comprehensive understanding of machine learning techniques, algorithms and their applications in various domains.
224CS1A6DB	DSE II: Big Data Technologies	To impart knowledge on modern big data frameworks that are essential for processing vast amounts of data efficiently, addressing the growing demand for big data solutions.
224CS1A6DC	DSE II: Cloud Computing Fundamentals	To provide a comprehensive understanding of cloud computing architecture and frameworks, enabling the development of scalable, reliable and cost-effective cloud-based applications. The board suggested to rename course title as "Fundamentals of Cloud Computing".
224CS1A6DD	DSE III: Decision Support Systems	To impart skills needed to design and implement systems that support decision-making processes, leveraging data, models, and tools to enhance business decisions and improve organizational performance.
224CS1A6DE	DSE III: Augmented Reality	To provide a comprehensive understanding of interactive reality technologies for designing immersive applications that blend digital and physical environments.
224CS1A6DF	DSE III: Fundamentals of Block Chain Technologies	To emphasize decentralized systems, block chain architecture and consensus algorithms for building secure, transparent and efficient IT-enabled business models based on block chain.

Courses Removed:

Course Code	Course	Reason
194CS1A6DA	DSE II: Business Intelligence	"Machine Learning" course is introduced to enhance and automate data analysis, expanding business intelligence applications and address broader industry needs.
194CS1A6DB	DSE II: Semantic web	Replaced with "Big Data Technologies"to handle and analyze massive datasets, aligning more closely with current curriculum trends and industry needs.
194CS1A6DD	DSE III: Middleware Technologies	Replaced with "Decision Support Systems" which offers a higher-level view, focusing on decision-making tools often built upon middleware infrastructure.
194CS1A6DE	DSE III: Mobile Ad-Hoc Networks	"Augmented Reality" has been included to provide students with skills that align closely with current tech trends and job market needs.
194CS1A6DF	DSE III: Social Network Data Analytics	"Big Data Technologies", "Machine Learning" and "Data Visualization" courses collectively cover the data processing, machine learning and visualization skills needed for Social Network Data Analytics.

After the discussion the following resolution with the above changes and modifications.

Resolution:

Resolved to approve the Syllabi for the VI Semester for students admitted in UG during the academic year 2022-23.

Item 18.5: *To consider and approve the courses offered by NPTEL that are equivalent to courses offered in the curriculum during III Semester for the students admitted during the academic year 2024-2025 and V Semester for the UG students admitted during the academic year 2023-2024.*

The board discussed the Courses offered by NPTEL that are equivalent to the Courses offered in the curriculum in III Semester for the UG students admitted during the academic year 2024-2025 and V Semester for the UG students admitted during the academic year 2023-2024.

Resolution:

Resolved to approve the courses that are equivalent to courses offered by NPTEL in the curriculum.

Item 18.6: *To consider and approve the Self Study course offered in III Semester for the students admitted in UG and PG during the academic year 2024-2025.*

The board discussed and approved the existing Self Study course offered in III Semester for the students admitted in UG and PG during the academic year 2024-2025.

Resolution:

Resolved to approve the Self Study course offered in III Semester for the students admitted in UG and PG during the academic year 2024-2025.

Item 18.7: *To approve* the *panel* of *examiners for question paper setting and evaluation of answer scripts for the even semester during the academic year 2024-2025.*

The Chairman presented the panel of examiners for question paper setting, question paper scrutiny and conduct of practical and theory of examination are submitted to CoE for exam related work.

Resolution:

Resolved to approve the panel of examiners for question paper setting and evaluation of answer scripts for the even semester of the academic year 2024-2025.

Item 18.8: *To consider and approve any other item brought forward by the Chairman and the members of the board.*

No other item was brought forward.

Finally, the Chairman thanked all the members for their cooperation and contribution in enriching the syllabus with active participation in the meeting and sought the same spirit in the future also. The meeting was closed with a formal vote of thanks proposed by Dr. S. Uma, Head and Chairman-Computer Science BoS.

Date: 07.11.2024

(Dr. S. Uma)

BoS Chairman/HoD
Department of Computer Science
Dr N. G. P. Arts and Science College
Coimbatore – 641 048

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSU2CA – OBJECT ORIENTED PROGRAMMING WITH C++

Unit	Existing	Changes
I	**Introduction to Object Oriented Programming** ~~Introduction – Programming Paradigms~~ - Key concepts of Object-Oriented Programming – ~~Applications of Object-Oriented Programming~~ - ~~Variable, Value and Constant – Components of a C++ Program~~ - ~~Data Types – Expressions – Type Conversion – Order of Evaluation – Formatting Data: Manipulators in Input/Output~~ - Branching and Looping.	Introduction to C++ Advantages –Structure of a C++ Program
II	**Classes and ~~Arrays~~** User-Defined Types: Classes-Class Definition-Member function- Access Modifiers-Inline function- Constructors and Destructors-Instance Members: Instance Data Members-Instance Member Functions -Static Members - ~~Arrays: One-Dimensional Arrays – Multidimensional Arrays. Case Study: Wave Array~~	Classes and Objects Declaring Objects – Array of objects – Friend functions – Overloading member functions
III	**Pointers, Strings and Inheritance** References - Pointers - Pointer Types and Pointer variables - Constant Modifiers – Pointer to Pointer- Arrays and Pointers - Strings: C ++ String Class -C++ String Library – Inheritance: Private, Public and Protected Inheritance - Association - Dependency	**Operator Overloading and Inheritance** Overloading unary, binary, assignment operators – Rules for overloading operators. Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multipath – Virtual base Classes
IV	**Polymorphism and Exception Handling** Polymorphism- Binding- Abstract Class : Pure Virtual Functions – ~~Multiple Inheritance~~ - Overloading Principles - Overloading as Member- Nonmember: Friend function-Exception Handling : ~~Approach-Exceptions in Classes – Standard Exception Classes~~ –	**Polymorphism and Virtual Functions** Declaration – Pointer to Class - Pointer to Object – this pointer – Array of classes – new and delete operators – Dynamic objects - Binding, Polymorphism and Virtual

	~~Templates: Function Template – Class Template.~~	Functions: Pointer to base and derived class objects, Virtual functions, Rules for virtual functions, Array of Pointers, Pure virtual functions.
V	**~~File Handling and~~ Standard Template Library** ~~Input and Output stream – Stream Classes – Console Streams – Console Objects – Stream State – File Streams – File I/O – Opening Modes – Sequential Vs Random Access – String Streams – Formatting Data: Direct use of Flags, Fields and Variables – Predefined Manipulators~~ Standard Template Library: ~~– Iterators, – Sequence Containers, Container Adapters.~~	**Templates, String and Exception Handling** Declaring and Initializing string objects – String Attributes- Exception Handling: Principles, try-throw-catch, Multiple catch statements.

PERCENTAGE OF SYLLABUS REVISED: 50 %

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name : 24CSU2CP - Data Structures using C++

S.No	Existing	Changes
1	Implementation of Conditional Statements and Loops	Implement Classes and Objects.
2	Implementation of Stack using array.	Implement Constructors and Destructors.
3	C++ Program to use constructors, destructors and inline member functions to read an integer number and find the sum of all the digits until it reduces to a single digit.	Implement Overloading.
4	Implementation of linked list using arrays.	Implement Inheritance.
5	C++ Program to create class, which consists of Employee details like E_Number, E_Name, Department, Basic Salary and Grade. Write a member function to get and display them. Derive a class Pay from the above class and write a member function to calculate DA, HRA and PF depending on the grade using Inheritance.	Implement Virtual Functions.
6	Implementation of Search Algorithms.	Implement Exception Handling.
7	Demonstrate Operator Overloading using Strings.	Develop applications using Stack.
8	Perform Tree Traversals.	Implement applications of Queue.
9	Implementation of File Operations.	Implement Polynomial addition using Linked List.
10	Implementation of graphs.	Demonstrate Tree Traversal Techniques.
11	C++ program to throw exception when entered marks are less than 0 or greater than 100.	Implement Breadth First Traversal using Graph
12	Implementation of Sorting algorithms.	Apply Recursion in Binary Search.

PERCENTAGE OF SYLLABUS REVISED: 90 %

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 234CS1A4CB – THEORY OF COMPUTATION

Unit	Existing	Changes
I	**Mathematical Notation and Techniques** Basic Mathematical Notation and Techniques : Formal Proofs – Deductive Proof -If- Then statements – Additional Forms of Proof – Inductive Proof – Problem in Induction– Basic Definitions – Equivalence of NDFA and DFA – Equivalence of NDFAs with and without E-moves	**Automata Theory** Set, Relation and Function-Introduction to formal proof - Additional forms of Proof - Inductive Proofs - Alphabets, Strings and Language-Finite representation of language-Chomsky Hierarchy.
II	**Regular Expression and Languages** Regular Languages – Regular Expressions-Equivalence of Finite Automaton and Regular Expressions: Conversion of Finite Automata (DFA) to Regular Expressions - Conversion of Conversion of Finite Automata (DFA) to Regular Expressions to Finite Automata (DFA) - Regular Expressions – Pumping Lemma for Regular Sets – Problems based on Pumping Lemme – Closure Properties of Regular Languages – Minimization of DFA	**Finite Automata and Regular Expression** Deterministic Finite Automata-Non-deterministic Finite Automata - Finite Automata with Epsilon Transitions. Regular Expressions - Finite Automata and Regular Expressions - Proving Languages not to be regular (Pumping Lemma) - Closure Properties of Regular Languages - Equivalence and Minimization of Automata.
III	**Context Free Grammar and Languages** Types of Grammar – Context-Free Grammars and Languages : Context Free Grammar – Derivations and Languages – Ambiguity : Ambiguity in Grammars and Languages – Unambiguous Grammar – Relationship between Derivation and Derivation Trees – Normal Forms : Chomsky Normal Form – Greibach Normal Form – Problems Related to CNF and GNF .	**Context Free Grammar and Pushdown Automata** Context Free Grammar (CFG) - Parse Trees - Ambiguity in Grammars and Languages - Pushdown Automata: Definition of Pushdown Automata-Languages of Pushdown Automata - Equivalence of Pushdown Automata and CFG - Deterministic Pushdown Automata.
IV	**Pushdown Automata** Introduction : Definition of Pushdown Automata – Graphical Notation of Pushdown Automata – Moves – Instantaneous Descriptions of Pushdown Automata – Languages of Pushdown Automata – Equivalence of Pushdown Automata and CFGs – Types of Pushdown Automata :Deterministic Pushdown	**Properties of Context Free Languages** Normal Forms for CFG - Simplification of CFG - Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) - Pumping Lemma for CFL - Closure Properties of CFL-Decision Properties of CFL's.

	Automata (DPDA) – Non Deterministic Pushdown Automata (NDPDA).	
V	**Turing Machine** Introduction – Computable Languages and Functions – Techniques for Turing Machine Construction – Multi Head and Multi-Tape Turing Machines – Non Deterministic Turing Machine – The Halting Problem – Partial Solvability – Problems about Turing Machines – Chomskian Hierarchy of Languages- Recursive and Recursively Enumerable Languages – Universal Turing Machine.	**Turing Machines** Definition-Notation for the Turing Machine-Instantaneous Descriptions of Turing Machines-Transition diagrams for Turing Machines-Language of a Turing Machine-Turing Machine and Halting- Programming Techniques for Turing Machine-Multitape Turing Machines - Non Deterministic Turing Machines - Restricted Turing Machines - Class P - Class NP - NP-Completeness.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: IV**

Course Code / Name : 234CS1A4SP- **SEC Practical II - Linux**

S.No	Existing	Changes
1	Perform directory operations.	Perform directory operations.
2	Perform file operations	Commands related to inode, I/O redirection, piping, process control commands, mails
3	Create a file and append data using CAT command	Write a shell script to change data format. Show the time taken in execution of this script.
4	Create a directory and changing the timestamp of a file or directory	Write a shell script to count lines, words and characters in its input. (do not use wc).
5	Create a nested directory and multiple directories	Write a shell script to compute GCD & LCM of two numbers
6	Perform various operations such as copying, moving and deleting file and directory	Write a shell script to print end of a Glossary file in reverse order using an array.
7	Create user with default and customized properties	Write a shell script to find the sum of the individual digits of a given number.
8	Create a new partition and delete partitions	Write a shell script to find whether a given number is prime.
9	Create a label with swap partition and visualize it	Write a shell script to reverse a given number.
10	Package Management System using Redhat package manager	Write a shell script to find the factorial of a given number.
11	Make a script file	Write a shell script to check if the string is a palindrome or not .
12	Update the partition information in kernal	Write a shell script to print Pascal's triangle.

PERCENTAGE OF SYLLABUS REVISED: 90 %

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6CA – DATA VISUALIZATION

Unit	Course Content
I	Introducing Visualization Data visualization: Need for data visualization- Communicating data-Process steps- Model of Communication- Types of Communication Problems- Principles of Communicating Data-Introduction to Tableau: Using Tableau- Tableau Products- Connecting to Data.
II	Working with Single and Multiple Data Sources Tableau: File Types - Workbook - Data Source File - Bookmark - Desktop Architecture - Data Layer - Data Connectors - Live Connection - Tableau Working Environment - Connect to a File - Connect to a Server - Metadata - Grid - Joins - Custom SQL - Data Blending - Data Extracts.
III	Sorting and Grouping Data Filtering - Sorting - Discrete and continuous data - Groups - Creating a group- Editing existing group - Creating Hierarchies - Sets - Difference between Set and Group - Measure Names - Measure Values - Table Calculations.
IV	Customizing Data and Dashboards Number Functions: Ceiling , Floor, Max, Abs - String Functions: Concatenation, Left, Find, Contains, Len - Logical Functions - Date Functions - Aggregate Functions - Table Calculation Functions - Dashboards: Types, Building, Exploring.
V	Measures of Central Tendency and Charts Measures of Central Tendency: Mean, Median, Mode- Dispersion: Range, Quartile, Variance, Standard Deviation - Charts: Box Plot, Pie Chart, TreeMaps, Heat Map, Line Graph, Stacked Bar Chart, Gantt Chart, Scatter Plot, Histogram.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
✓	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6DB – BIG DATA TECHNOLOGIES

Unit	Course Content
I	Big Data Classification of digital data – Characteristics of data –Evolution- Challenges – Five Vs- Business Intelligence vs Big Data - Warehouse environment-Hadoop environment-Classification of analytics -Data science – Terminologies in big data environments - Big data applications.
II	Hadoop Hadoop Eco system - Hadoop core components - Hadoop distributions- Hadoop Distributed File System (HDFS) - Commands - Processing data with Hadoop - NameNode - Secondary NameNode and DataNode - Introduction to MapReduce Programming - Mapper - Reducer-Combiner - Partitioner - Searching- Sorting –Compression.
III	Hive Introduction- Architecture - Data types - File format– Hive Query Language (HQL) – Data definition – Data manipulation – Database - Tables– Partition – Bucketing -Queries - Views - Indexes – Join –Aggregations – User defined functions.
IV	Pig Pig Features - Data Model - Pig Latin – Data Types – Interactive mode – Batch mode – Local and MapReduce mode - Relational operators - User Defined Functions – Parameter substitution - Embedding Pig latin in Python
V	Spark and Kafka Hadoop and Spark - Spark programming languages - Spark Architecture - Spark Libraries: Spark SQL - Streaming - Machine learning - GraphX - Spark with Python - Working with Kafka: Kafka Architecture - Need of Apache Kafka - Use cases - Components of Kafka

PERCENTAGE OF SYLLABUS REVISED: 100 %

- [✓] Skill Development
- [ ] Entrepreneurial Development
- [✓] Employability
- [✓] Innovations
- [ ] Intellectual Property Rights
- [ ] Gender Sensitization
- [ ] Social Awareness/ Environment
- [ ] Constitutional Rights/ Human Values/ Ethics

Syllabus Revision-New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name 224CS1A6SP – R Programming

1	Script to demonstrate usage of Data types, Variables and Operators.
2	Programs using control structures.
3	Demonstrate loop constructs.
4	Script to demonstrate functions.
5	Program to perform string manipulation functions.
6	Perform various kinds of Join Operations.
7	Apply sorting operations.
8	Demonstrate vectors, lists and arrays.
9	Program to import an Excel file into R.
10	Program to extract columns from a data frame.
11	Create different types of charts.
12	Program to read a CSV file and analyze the data in the file.

PERCENTAGE OF SYLLABUS REVISED: 100 %

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6DC– FUNDAMENTALS OF CLOUD COMPUTING

Unit	Course Content
I	**Cloud Computing**: Introduction - Cloud Components - Infrastructure - Services - Applications - Intranets and the cloud - Cloud Benefits - Limitations - Security Concerns.
II	**Cloud Architecture** : Cloud Computing Reference model-Types of cloud - Economics of cloud -Cloud Services: Cloud Service Providers - Cloud computing services - Operational benefits - Economical Benefits - Datacenter Operations.
III	**Cloud Technology**: Hardware and Infrastructure: Clients - Security - Network - Public Internet - Site-to-Site - VPN - Cloud Providers - Consumers - Redundancy - Services - Accessing the Cloud: Platforms - Web Applications - Web APIs - Web browsers.
IV	**Cloud Storage** : Security - Reliability - Advantages - Cautions - Outrages - Theft - Storage Providers - Cloud Standards: Application - Client - Infrastructure - Service - Software as a Service: Driving Forces - Company offerings - Industries - Software plus Services : Mobile device integration - Storage models.
V	**Cloud Applications** : Google Payment - Google Gears - Microsoft live Services - SQL Services - .NET Services - Application Management - Virtualization: Server Solutions - VMware - VMware Infrastructure - Thin Clients: Sun, Dell - Cloud Services for Individuals.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6DA – MACHINE LEARNING

Unit	Course Content
I	Introduction to Machine Learning Introduction to Machine Learning - Supervised learning - Unsupervised learning - Reinforcement learning - Comparison- Applications - Machine Learning Activities - Types of Data - Exploring Structure of Data - Data Quality and Remediation - Data Pre-Processing.
II	Modeling and Evaluation Selecting Model - Predictive, Descriptive Models - Training a Model - Holdout method - k-fold Cross-validation method - Bootstrap Sampling - Model Representation and interpretability - Underfitting - Overfitting - Bias - Variance - Evaluating and improving performance of a model.
III	Supervised Learning Classification: Learning Steps - Classification Algorithms - k-Nearest Neighbour (kNN) - Decision tree - Regression: Simple linear regression -Regression Analysis: Assumptions, Problems - Improving Accuracy of the Linear Regression Model.
IV	Unsupervised Learning Unsupervised Vs Supervised Learning - Application of Unsupervised Learning - Clustering - Clustering techniques: Partitioning methods, K-Means, Hierarchical clustering, DBSCAN - Association Rule Learning - Finding Patterns using Association Rule - Apriori algorithm.
V	Neural Network Biological Neuron - Artificial Neuron - Types of Activation Functions - Implementations of Artificial Neural Network (ANN) - Architectures of Neural Network - Learning Process in ANN - Backpropagation.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6DE – AUGMENTED REALITY

Unit	Course Content
I	**Virtual Reality** Modern VR Experiences - Overview of VR systems: Hardware – Software- Human Physiology and Perceptions- The Geometry of Virtual Worlds: Geometric Models - Changing Position and Orientation – Axis Angle Representations of Rotation - Light and Optics: Basic Behavior of Light - Lenses - The Human Eye - Cameras.
II	**Augmented Reality** Introduction- Applications of AR - Calibration: Camera Calibration – Intrinsic and Extrinsic Parameters - Setup for AR - Techniques – Tools – Registration - Pose Estimation - Tracking: Pose Tracking – Classifications of Tracking – Stationary Tracking Systems -Mobile Sensor based Tracking – Optical and Hybrid Tracking – Marker Based Tracking.
III	**Computer Vision for AR** Image processing - Computer Vision - Object Detection - Spatial Mapping - 3D outdoor Tracking. 3D Graphics in AR: Basics of 3D Computer Graphics - 3D Rendering - 3D Modeling Software - Graphic Libraries - OpenCV and OpenGL to create AR.
IV	**Designing and Developing AR Systems** Design principles for AR: Interaction for AR – Software Architecture and Design Patterns for AR - AR Interfaces - Developing AR Systems: Non programming Frameworks - Programming Frameworks – Commercial Frameworks - Platforms and Toolkits for development – Developing Web based AR – AR Markup Languages.
V	**Mobile AR** Types of Mobile Apps - AR Browsers for Smartphones – Point of Interests in Mobile AR – AR Applications for Android - Developing Mobile AR Applications: Developing and Creating an AR application using sensor data - AR Application Development using different Platforms - Developing AR applications for Smartphones.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
✓	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 234CS1A6DD – DECISION SUPPORT SYSTEMS

Unit	Course Content
I	**Introduction to Decision Support Systems** : Human decision making process - Definition - Decision process - Decision Types - Decision making in business - Impacts - Kepner-Tregoe Decision making method. Systems Information Quality and Models: Information system - Data flow diagrams - DSS as Information Systems - Information and Quality - Models.
II	**Type of Decision Support Systems** : DSS hierarchy - Categories - Matching DSS to the Decision type and Decision makers psychological type -Individual and Group DSS - Benefits to user Community - Usage Modes.
III	**DSS Architecture and Software Tools** : Major options - Central corporate system - Client/Server computing - Shared data - Stand-Alone System - DSS Software Categories - Standard Packages - DSS Programming Languages and User interfaces.
IV	**Building and Implementing Decision Support Systems** : Development process - Project participants - Implementation stage - System conversion - Overcoming resistance to change - Implementation and Ethical Issues. Models in Decision Support Systems: Types of models
V	**Group Decision Support Systems** : Need for Group DSS - Group Vs Individual activities - Media richness and Task types – Types of group – Groupware – Groupware products - Constructing a data warehouse system - Stages of Project - The Planning and Architecture Stage - Data Warehouse Design Approaches

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision - New Course

Faculty: Computer Science **Board: Computer Science** **Semester: VI**

Course Code / Name: 224CS1A6DF – FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY

Unit	Course Content
I	Basics of Blockchain Concept - History - Definition - Fundamentals - Characteristics - Consensus in Trust-Building - Categories: Public, Private and Hybrid - Distributed Ledger Technologies - Decentralized Applications and Databases - Architecture - Transactions - Chaining Blocks - Value Proposition.
II	Decentralized System and Hash Functions Distributed Decentralized databases - Decentralized Enterprise - Decentralization – Disintermediation - Decentralized Enterprise Regulation - Hashing - Message Authentication Code - Secure Hash Algorithm (SHA-1) - Distributed Hash Tables - Hashing and Data Structures - Hashing in Blockchain Mining.
III	Consensus and Cryptography Consensus approach - Algorithm - Byzantine agreement methods - Cryptography: primitives - Symmetric and Asymmetric cryptography.
IV	Components Ethereum: Ethereum Virtual machine - Working - Clients - Key-pairs - Addresses - Wallets - Transactions - Bitcoin: Working - Merkle Trees - Block Structure - Address - Transactions - Network - Wallets - Payments.
V	Smart Contract Absolute and immutable - Contractual confidentiality - Law implementation and settlement - Characteristics - Internet of Things - Utilities - Proof of origin - Supply chain management - Case Study.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSP2CA – ADVANCED PYTHON PROGRAMMING

Unit	Existing	Changes
I	Data Structures in Python Variables - Basic Program Structure - Conditional Operations - Iterative Routines - Functions and Modules - String - Tuple - List - Dictionary - Set - Operators with Sequences - Iterator - Slicing - Reversing - Sorting - Operations with Sequences - Operations with Sets - Frozensets - Operations with Dictionaries.	Unit II moved to Unit I
II	**NumPy** NumPy Arrays - Computation on Numpy Arrays - Universal Functions - Aggregations - Computation on Arrays: Broadcasting, Comparisons, Masks, Boolean Logic - Fancy Indexing - Sorting Arrays - Structured Arrays.	Unit III moved to Unit II
III	**Data Manipulation with Pandas** Pandas - Objects -Data Indexing and Selection - Operating on Data -Handling Missing Data -Hierarchical Indexing - Combining Datasets: Concat and Append,Merge and Join, Aggregation and Grouping - Time Series	Unit IV moved to Unit III
IV	**Visualization with Matplotlib** Importing Matplotlib- Setting Styles - Line Plots - Scatter Plots - Visualizing Errors - Density and Contour Plots - Histograms, Binnings and Density - Customizing: Plot Legends, Color bars, Ticks - Multiple Subplots - Text and Annotation - Three-Dimensional Plotting in Matplotlib - Visualization with Seaborn	**Artificial Neural Network with Keras** Perceptron - Multilayer Perceptron (MLP) and Backpropagation – MLP: Regression, Classification, Implementation - Building an Image Classifier Using the Sequential API - Building a Regression MLP Using the Sequential API - Building Complex Models Using the Functional API - Subclassing API to Build Dynamic Models - Fine-Tuning Neural Network Hyperparameters.
V	**Data Analysis with Scikit-Learn**	**Training and Deploying TensorFlow Models**

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSP2CA – ADVANCED PYTHON PROGRAMMING

Unit	Existing	Changes
1	Demonstrate Python Functions and Modules	Develop a Python script to perform basic operations using NumPy.
2	Implement a Python program to perform List, Tuple, Dictionary operations.	Create a structured array for the student's details which includes Student id, Student name, Height, Class and perform Sorting, Grouping operations.
3	Develop a Python script to perform basic operations using NumPy.	Perform Universal and Aggregate functions in NumPy.
4	Create a structured array for the student's details which includes Student id, Student name, Height, Class and perform Sorting, Grouping operations.	Implement the concept of Pandas to demonstrate data handling, indexing and Slicing Operations.
5	Implement Universal and Aggregate functions in NumPy.	Build a DataFrame and display the specific dictionary data that includes index and labels to: a) Display the summary details b) Count the number of rows and columns c) Select the specific rows and columns d) Count the number of rows with NaN values e) Iterate the DataFrame to display the specific rows
6	Implement the concept of Pandas to demonstrate data handling, indexing and Slicing Operations.	Demonstrate the use of Matplotlib modules in plotting.
7	Build a DataFrame and display the specific dictionary data that includes index and labels to perform: a) Display the summary details b) Count the number of rows and columns c) Select the specific rows and columns d) Count the number of rows with NaN values e) Iterate the DataFrame to display the specific rows	Build a Dataset in Excel file and Create a Python script to import Dataset into Pandas DataFrame and perform Read, Sort, Export operations in it.

	Machine Learning - Scikit-Learn - Hyperparameters and Model Validation - Feature Engineering - Naive Bayes Classification - Linear Regression - Decision Trees and Random Forests - Principal Component Analysis - k-Means Clustering. Case Study: A Face Detection Pipeline.	Serving a TensorFlow Model - Deploying a Model to a Mobile or Embedded Device - Using a GPU - Equipped Virtual Machine – Colaboratory - Managing the GPU RAM - Placing Operations and Variables on Devices - Parallel Execution Across Multiple Devices - Training Models Across Multiple Devices - Case Study.

PERCENTAGE OF SYLLABUS REVISED: 40 %

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 234CS2A2CB – MODERN DATABASE MANAGEMENT SYSTEMS

Unit	Existing	Changes
I	**Relational Databases** Introduction to the Relational Model - Structure of Relational Databases - Database Schema - Keys - Schema Diagrams - Relational Query Languages - Relational Operations -Introduction to SQL- Overview of the SQL Query Language-SQL Data Definition- Basic Structure of SQL Queries- Additional Basic Operations- Set Operations - Null Values - Aggregate Functions - Nested Sub queries - Modification of the Database.	**Database System Architecture** Centralized Database Systems - Server system architectures - Parallel systems - Distributed Systems - Transaction Processing in Parallel and Distributed Systems - Cloud-Based Services - Data Partitioning - Dealing with Skew in Partitioning - Replication - Parallel Indexing - Distributed File Systems.
II	**Intermediate and Advanced SQL** Join Expressions -Views - Transactions - Integrity Constraints - SQL Data Types and Schemas - Authorization -Accessing SQL From a Programming Language - Functions and Procedures - Triggers - Recursive Queries- Advanced Aggregation Features- OLAP.	**Parallel and Distributed Query Processing** Parallel Sort - Parallel Join - Parallel Evaluation of Query Plans - Shared - Memory Architectures - Query Optimization for Parallel Execution - Parallel Processing of Streaming Data - Distributed Query Processing.
III	**Database Design** Database Design and the E-R Model- Overview of the Design Process- The Entity Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity-Relationship Diagrams - Reduction to Relational Schemas - Entity Relationship Design Issues - Extended E-R Features-Relational Database Design Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies.	**Distributed Database Concepts** Data Fragmentation, Replication, Allocation Techniques for Distributed Database Design - Overview of Concurrency Control and Recovery in Distributed Databases - Transaction Management in Distributed Databases - Query Processing and Optimization in Distributed Databases - Types of Distributed Database Systems - Distributed Database Architectures .
IV	**Query Processing and Transaction Management**	**NOSQL Databases and Big Data Storage Systems**

8	Demonstrate on how to write a Python dictionary to a CSV file. After writing the CSV file, read the CSV file, perform preprocessing and basic operations on dataframe.	Implement a Regression Model in Keros.
9	Build a Dataset in Excel file and create a Python script to import Dataset into Pandas DataFrame and perform Read, Sort, Export operations in it.	Implement Image Classifier using CNN in Keros
10	Demonstrate use of Matplotlib modules in plotting.	Perform Transfer Learning using a Pretrained Model on Keros.
11	Demonstrate Data Visualization using Seaborn.	Implement Simple Vector Addition in TensorFlow.
12	Perform Data Analysis with Scikit-Learn.	Implement a Perceptron in TensorFlow Environment.

PERCENTAGE OF SYLLABUS REVISED: 50 %

	Query Processing - Overview - Measures of Query Cost - Selection Operation - Sorting - Join Operation - Other Operations - Evaluation of Expressions - Transactions- Transaction Concept-A Simple Transaction Model - Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability Transaction Isolation and Atomicity - Transaction Isolation Levels - Implementation of Isolation Levels -Transactions as SQL Statements.	Concepts of NoSQL database - Types of NoSQL database - The CAP Theorem - Document-Based NOSQL Systems and MongoDB - NOSQL Key-Value Stores - Column-Based or Wide Column NOSQL Systems - NOSQL Graph Databases .
V	**Lock-Based Protocols and Recovery** Lock-Based Protocols-Deadlock Handling-Multiple Granularity- Insert Operations, Delete Operations, and Predicate Reads-Timestamp-Based Protocol- Validation Based Protocols-Multi version Schemes-Snapshot Isolation- Failure Classification Storage- Recovery and Atomicity- Recovery Algorithm- Buffer Management Recovery in Main- Memory Databases.	**Document Databases** XML and XML Databases - XML Tools and Standards - XML Databases - XML Support in Relational Systems - JSON Document Databases - JSON Databases - Data Models in Document Databases - Early JSON Databases - MemBase and CouchBase - Column Databases : Data Warehousing Schemas - Column Database Architectures .

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability		Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

	Approximate Second-order Methods - Optimization Strategies and Meta-Algorithms.	
V	**Optimization for Training Deep Models** Learning Differs from Pure Optimization - Challenges in Neural Network Optimization - Basic Algorithms - Parameter Initialization Strategies - Algorithms with Adaptive Learning Rates - Approximate Second-order Methods - Optimization Strategies and Meta-Algorithms.	**Representation Learning** Scenarios - Autoencoder Fundamentals - Representation Learning in Text – Word Embedding – Document Embedding - Sequence-based Models: Sequence Data, Recurrent Neural Network, Long Short-term Memory, Gated Recurrent Units, Bi-directional Models, Language Modeling and Sequence Models– Transfer Learning. **Case Study :** Colourization of Grayscale Images

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
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Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSP2CQ – MODERN DATABASE MANAGEMENT SYSTEMS

Unit	Existing	Changes
1	Implement DDL, DML and TCL Commands.	Execute concurrent queries and measure query performance.
2	Demonstrate Data and Built in Functions in SQL.	Perform parallel join operations.
3	Perform Relational algebra queries for a set of relations.	Create a simple column-based NoSQL database and demonstrate column-based storage and retrieval.
4	Implement different Normalization.	Experiment with different data fragmentation techniques (horizontal, vertical, and hybrid) in a distributed setup.
5	Implementation of Views.	Perform MongoDB CRUD Operations, Indexing and Sharding.
6	Implementation of Cursors.	Demonstrate CRUD operations in MongoDB
7	Implementation of Triggers.	Perform Multimedia data Processing in MongoDB
8	PL/SQL Procedures and Functions.	Demonstrate Transformation in MongoDB
9	Error and Exception Handling.	Implement the concept of basic key-value store using a NoSQL system, storing and retrieving large amounts of data.
10	Demonstrate E-R Diagram for Database.	Perform basic graph operations like finding shortest paths or detecting cycles.
11	Implementation of Transaction Management.	Create an XML data model and integrate it with a relational system to support XML data in a relational database.
12	Database Connectivity.	Create an XML database, load XML data, and perform queries using XPath or XQuery.

PERCENTAGE OF SYLLABUS REVISED: 100 %

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSP2DA – DEEP LEARNING

Unit	Existing	Changes
I	**Deep Learning** Learning Algorithms - Capacity, Overfitting and Underfitting – Hyperparameters and Validation Sets, Maximum Likelihood Estimation- Bayesian Statistics - Supervised Learning Algorithms - Unsupervised Learning Algorithms – Stochastic Gradient Descent - Challenges Motivating Deep Learning.	**Deep Learning Concepts** Machine Learning: Types – Process - Machine Learning Versus Traditional Computer Programming – - Model Evaluation - Model Representation and Interpretability - Loss Functions – Limitations - Neural Network: Understanding the biological Neuron – Exploring the Artificial Neuron – Types of Activation Functions: Hyperbolic Tangent(Tanh), ReLU (Rectified Linear Unit), Softmax.
II	**Deep Feedforward Networks** Learning XOR - Gradient-Based Learning - Hidden Units - Architecture Design - Back-Propagation - Other Differentiation Algorithms.	**Training Deep Neural Network** Deep L-layer Neural Network - Forward and Backward Propagation in Deep Learning - Initializing Weights - Batch, Mini-batch and Stochastic Gradient Descent - Optimization Algorithms: Gradient Descent with Momentum, Adagrad, Adadelta, RMSProp , Adam – Regularization – Normalization of inputs.
III	**Regularization for Deep Learning** Parameter Norm Penalties - Norm Penalties as Constrained Optimization - Regularization and Under-Constrained Problems - Dataset Augmentation - Noise Robustness - Semi-Supervised learning - Multitask Learning - Early Stopping - Sparse Representations - Bagging and other Ensemble Methods.	**Convolutional Neural Network** Computer Vision - Challenges in Traditional ANN – Building Blocks - Building a Conventional Neural Network- Popular CNN Architectures: LeNet5, AlexNet, VCG16, ResNet, GoogLeNet, UNet.
IV	**Optimization for Training Deep Models** Learning Differs from Pure Optimization - Challenges in Neural Network Optimization - Basic Algorithms - Parameter Initialization Strategies - Algorithms with Adaptive Learning Rates -	**Deep Learning Architectures** Encoder-Decoder Architecture – Attention Mechanism – Transformer Architecture: Multi-headed Attention, Transformer Modes, Popular Transformer Architectures – Generative Adversarial Network (GAN): Basic Concepts – Popular Variants– Applications.

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: IV**

Course Code / Name: 24CSP2DB– PREDICTIVE ANALYTICS

Unit	Existing	Changes
I	Analytics and Data Mining - Introduction to Analytics - Application areas of analytics - challenges and longitudinal view of analytics. Introduction to predictive analytics and data mining: Most common data mining applications - Kind of patterns data mining can discover - popular data mining tools.	Analytics and Process Models Analytics – Predictive Analytics - Supervised Vs Unsupervised learning – Parametric Vs Non- Parametric Models – Statistic and Analytics – Challenges in Using Predictive Analytics – Predictive Analytics Processing Steps: CRISP-DM (The Cross –Industry Standard Process Model for Data mining) - Defining Data for Predictive Modeling – Defining the Target Variable - Defining Measures of Success for Predictive Models.
II	Standardized Process for predictive analytics KDD process - CRISP-DM Cross-Industry standard process for data mining - SEMMA. Data and Methods for predictive Analytics: Nature of data in data analytics - Preprocessing of Data for Analytics - Data Mining Methods - Prediction - Classification - Decision Tree - Cluster Analysis for Data Mining - K-Means Clustering Algorithm - Association - Apriori Algorithm - Data mining and predictive analytics misconceptions and realities.	**Data Understanding and Data Preparation** Single Variable Summaries – Mean – Standard Deviation – The Normal Distribution – Uniform Distribution – Skewness – Kurtosis - Data Visualization in one Dimension – Histograms – Multiple Variable summaries – Variable Cleaning – Incorrect Values – Consistency in Data Formats – Outliers – Multidimensional Outliers - Missing Values - Fixing Missing Values – Features Creation.
III	Algorithms for Predictive Analytics 12 h Naive Bayes - Nearest Neighbor - Similarity Measure-Distance Metric - Artificial Neural Network - Support Vector Machine - Linear and logistic regression - time series forecasting.	**Descriptive Modeling** Data Preparation Issues with Descriptive Modeling – The PCA (Principal Component Analysis) Algorithm – Applying PCA to New Data – PCA for Data Interpretation –

		Clustering Algorithm – The K-Mean Algorithm – Data Preparation for K-Mean – Selecting the Number of Clusters. Interpreting Descriptive Model – Standard Cluster Model Interpretation – Problem with Interpretation Methods – Identifying Key Variables in Forming Cluster Models – Cluster Prototypes - Cluster Outliers.
IV	Predictive Modeling Model Ensembles - Bias variance trade – off in predictive analytics - Imbalanced data problems in predictive analytics - Explain ability of machine learning model for predictive analytics.s	Predictive Modeling Decision Tree –Building Decision Tree – Decision Tree Splitting Metrics – Decision Tree Knobs and Options - Logistic Regression – K-Nearest Neighbour – Naive Bayes – Regression Models – Linear Regression.
V	Big data for predictive analytics Fundamental concepts of bigdata - Business problems that big data Analytics addresses - Big data technologies. Deep learning and Cognitive Computing: Introduction - Elements of Artificial Neural Network - Deep Neural networks - Convolutional Neural Network - Cognitive computing.	**Forecasting** Introduction – Nature of Forecasts-Forecasting Procsess – Resource for Forecasting – Graphical Displays – Time Series Plot – Plotting Smoothed Data – Numerical Description of Time Series Data – Stationary Time Series - Autocovariance and Autocorrelation Functions – Use of Data Transformation and Adjustments – Transformations – Trend and Seasonal Adjustment – General Approach to Time Series Modeling and Forecasting.

PERCENTAGE OF SYLLABUS REVISED: 100 %

✓	Skill Development		Entrepreneurial Development
✓	Employability	✓	Innovations
	Intellectual Property Rights		Gender Sensitization
	Social Awareness/ Environment		Constitutional Rights/ Human Values/ Ethics

Syllabus Revision

Faculty: Computer Science **Board: Computer Science** **Semester: II**

Course Code / Name: 24CSP2DC – ADVANCED NETWORKS

Unit	Existing	Changes
I	**Network Basics** Network Edge: Access Networks, Physical Media - Network Core: Packet Switching, Circuit Switching- Network of Networks - Packet-Switched Networks: Delay, Loss, Throughput - Protocol Layers Service Models: Layered Architecture - Encapsulation - Networks under Attack-Application Layer: Principles of Network Applications -Web and HTTP - Video Streaming - Content Distribution Networks - Socket Programming: Creating Network Applications	**Network Basics** Networking and Network Routing-IPv4 and IPv6 Addressing-Service Architecture- Protocol Stack Architecture, Router Architecture- Network Topology Architecture- Network Management Architecture, Global Telephone Network-Communication Technologies-Routing Algorithms: Shortest Path, Widest path and Spanning Tree.
II	**Transport and Network Layer** Transport Layer: Connectionless Transport UDP- Principles of Reliable Data Transfer-Connection-Oriented Transport TCP-Principles of Congestion Control- Network Layer Data Plane: Internet Protocol, IPv4 Addressing, IPv6 -Network Layer Control Plane: Routing Algorithms- Intra-AS Routing- Routing among ISPs- SDN Control Plane.	**Networking Sensors** Introduction- Medium Access Control-The S-MAC Protocol- IEEE 802.15.4 Standard and ZigBee- General Issues-Geographic, Energy-Aware Routing-Unicast Geographic Routing-Routing on a Curve-Energy-Minimizing Broadcast - Energy-Aware Routing to a Region-Attribute-Based Routing-Directed Diffusion-Rumour Routing -Geographic Hash Tables- Infrastructure Establishment: Topology Control-Clustering- Time Synchronization-Localization and Localization Services.
III	**Data Link Layer** Error Detection and Correction Techniques - Multiple Access Links and Protocols - Switched Local Area Networks - Link Virtualization: A network as a Link Layer - Data Canter Networking: Data canter Architectures, Trends in Data Canter Networking	**Software-Defined Networking (SDN)** Fundamental Characteristics of SDN-SDN Operation- SDN Devices-Controller, SDN Applications- Alternate SDN Methods- SDN in Other Environments: Wide Area Networks- Service Provider and Carrier Networks- Campus Networks-Hospitality Networks- Mobile Networks-Optical Networks- SDN vs P2P/Overlay Networks.

IV	**Wireless and Mobile Networks** Wireless Links and Network Characteristics - WiFi 802.11 Wireless LANs - Cellular Networks 4G and 5G - Mobility Management Principles - Impact on higher layer protocols.	No Changes in UNIT IV
V	**Security in Computer Networks** Principles of Cryptography - Message Integrity and Digital Signatures-End-Point Authentication- Securing E-Mail - Securing TCP Connections - Network Layer Security - Securing Wireless LANs and 4G/5G cellular Networks -Operational Security.	No Changes in UNIT V

PERCENTAGE OF SYLLABUS REVISED: 40 %

- [✓] Skill Development
- [✓] Employability
- [ ] Intellectual Property Rights
- [ ] Social Awareness/ Environment
- [ ] Entrepreneurial Development
- [ ] Innovations
- [ ] Gender Sensitization
- [ ] Constitutional Rights/ Human Values/ Ethics

Dr. N.G.P. ARTS AND SCIENCE COLLEGE

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(Approved by Government of Tamil Nadu & Accredited by NAAC with A++ Grade (3rd Cycle - 3.64 CGPA)
Dr. N.G.P. - KalapattiRoad, Coimbatore – 641 048, Tamil Nadu, India
Web : www.drngpasc.ac.in | Email : info@drngpasc.ac.in | Phone : +91-422-2369100

DEPARTMENT OF COMPUTER SCIENCE
EIGHTEENTH MEETING OF BOARD OF STUDIES

VENUE: Avvai Arangam **DATE: 07.11.2024** **TIME: 10.00 a.m.**

The following members were present for the Board of Studies Meeting

S. NO.	NAME	POSITION	SIGNATURE
1	Dr. S. Uma	Chairman	7/11/24
2	Dr. D. Ramya Chitra, Associate Professor, Dept. of Computer Science Bharathiar University Coimbatore-641046.	Member (Subject Expert) (Nominated by Vice Chancellor)	7/11/24
3	Dr. Chandra Blessie E, Associate Professor, Department of Artificial Intelligence and Machine Learning, Coimbatore Institute of Technology, Coimbatore - 641046.	Member (Subject Expert) (Nominated by Academic Council)	7/11/24
4	Dr. Radhika N Professor School of Computing Amrita Vishwa Vidyapeetham Coimbatore – 641112.	Member (Subject Expert) (Nominated by Academic Council)	7/11/24
5	Mr. Kousik Rajendran, 1D, Mist Block, Mount Raindrop Apartment, Nehru Nagar West, Kalapatti, Coimbatore-641048.	Member (Industrial Expert)	ABSENT
6	Ms. V. Divya Bharathi, No.59, Brindha Garden, Kalapatti, Coimbatore – 641048.	Alumni	
7	Mr. B. Justin Sam Ebinezar III B.Sc. CS 'A'	Student Member	

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8	Mr. B. Aravindhan II M.Sc. CS	Student Member	
9	**Part I (Two Semester Language)** Dr. N. Kuppuchamy, Dept. of Tamil	Co-Opted Member	
	Part II (Two Semester Language) **Dr. A. Hazel Verbina,** Dept. of English		
	IDC Dr. R. Sowrirajan, Dept. of Mathematics		
10	Dr. Angeline Prasanna G	Member	
11	Dr. M. Sangeetha	Member	
12	Dr. B. Sivaranjani	Member	
13	Dr. S. Omprakash	Member	
14	Dr. P. Usha	Member	
15	Dr. R. Kalaivani	Member	
16	Mr. V.S. Jagadeeswaran	Member	
17	Mr. N. Kumar	Member	
18	Dr. S. Maheshwari	Member	
19	Ms. V. Bakyalakshmi	Member	
20	Mrs. S. R. Kalaiselvi	Member	ABSENT
21	Mrs. V. Revathi	Member	
22	Dr. R. Kavitha	Member	
23	Ms. K. R. Prabha	Member	
24	Ms. S. Priyadharshini	Member	

Date: 07.11.2024

Academic Council CHAIRMAN Dr. N.G.P. Arts and Science College

BoS Chairman/HoD
Department of Computer Science
Dr. N. G. P. Arts and Science College
Coimbatore – 641 048