DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRPATI SAMBHAJINAGR.

CIRCULAR NO.SU/CBC&GS/B.Sc. Honor's/Model College/39/2024

It is hereby inform to all concerned that, the syllabi prepared by the Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following syllabi under Choice Based Credit & Grading System as per Guidelines of UGC** run at Model College, Ghansawangi Dist.-Jalna in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	Honours Degree of B.Sc. Biotechnology	Vth & VIth
2.	Honours Degree of B.Sc. Computer Science	Vth & VIth

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar
431 004.
REF.NO.SU/2024/7308-16
Date:- 10.09.2024

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal, Model College, Ghansawangi Dist. Jalna**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] **The Director, Board of Examinations & Evaluation,** Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

3] The Programmer [Computer Unit-1] Examinations,Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations,Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

5] The In charge,[E Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

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Dr. Babasaheb Ambedkar Marathwada University
Chhatrapati Sambhajinagar - 431004 (MS) India.

Undergraduate Bachelor Degree Program
in

B.Sc. Computer Science
(Honours)
Faculty of Science and Technology

Course Structure and Curriculum

(Outcome based Curriculum)

Choice Based Credit System

(Effective from Academic Year 2024-25)

Run at Model Degree College, Ghansawangi. Dist: Jalna

Semester V									
	Name of Course	Course Code	Course Title	(Teaching periods/week)	Credits	Scheme of Examination			
						Max Marks	CIA	UA	Min Marks
Optional I (DSE-1C) Discipline Specific Core Course	Core A	CSCA-501	Introduction to Big Data	3Hours /week	3	50	20	30	20
	Core B	CSCB-502	Numerical Methods	3Hours /week	3	50	20	30	20
	Practical based on Core A	CSCA-501P	Lab Course-XVII Practical Based on Big Data	4Hours/week	2	50	0	50	20
	Practical based on Core B	CSCB-502P	Lab Course-XVIII Practical Based on Numerical Methods	4Hours/week	2	50	0	50	20
Optional II (DSE-2C) Discipline Specific Core Course	Supportive	CSCS-503	Software Engineering	2Hours /week	2	50	20	30	20
	Practical based on Supportive	CSCS-503P	Lab Course-XIX Case Study	4Hours/week	2	50	0	50	20
Optional III (DSE-3C) Discipline Specific Core Course	Applied A	CSCAA-504	A1: Advanced Java A2: PHP (Select any one paper from A1/A2)	2Hours/week	2	50	20	30	20
	Practical based on Applied A	CSCAA-504P	Lab Course-XXA1: Practical based on Advanced Java Lab Course-XXA2: Practical based on PHP	4Hours/week	2	50	0	50	20
	Applied B	CSCAB-505	B1: Data Mining B2: Theory of Computation (Select any one paper from B1/B2)	2Hours/week	2	50	20	30	20
	Practical based on Applied B	CSCAB-505P	Lab Course - XXIB1: Practical	4Hours/week	2	50	0	50	20

			based on Data Mining Lab Course-XXIB2: Practical based on Theory of Computation						
Skill Enhancement Course (SEC-1)	Job Oriented Soft Skills	CSC-JOC-506	JOC(Job Oriented Course) Aptitude and Logical Reasoning	4Hours/week	4	50	20	30	20
	Value Oriented Courses	CSC-VOC-507	VOC (Value Oriented course) Personality Development	4Hours/week	4	50	20	30	20
				40	30	700	200	500	280
Total Credits for Semester III : 30 (Theory : 20 ; Laboratory : 10)									

Semester VI									
	Name of Course	Course Code	Course Title	(Teaching periods/week)	Credits	Scheme of Examination			
						Max Marks	CIA	UA	Min Marks
Optional I (DSE-1C) Discipline Specific Core Course	Core A	CSCA-601	Java Web Frameworks	3Hours /week	3	50	20	30	20
	Core B	CSCB-602	Web Fundamentals	3Hours /week	3	50	20	30	20
	Practical based on Core A	CSCA-601P	Lab Course-XXII Practical based on Java Web Frameworks	4Hours/week	2	50	0	50	20
	Practical based on Core B	CSCB-602P	Lab Course-XXIII Practical based on web Designing	4Hours/week	2	50	0	50	20
Optional II (DSE-2C) Discipline Specific Core Course	Supportive	CSCS-603	Software Quality Assurance & Testing	2Hours /week	2	50	20	30	20
	Practical based on Supportive	CSCS-603P	Lab Course-XXIV Practical based on Software Quality Assurance & Testing	4Hours/week	2	50	0	50	20
Optional III (DSE-3C) Discipline Specific Core Course	Applied A	CSCAA-604	A3: Cloud Computing A4: Cybersecurity (Select any one paper from A3/A4	2Hours/week	2	50	20	30	20
	Applied B	CSCAB-605	B3: Data Warehousing B4: IoT (Internet of Things) (Select any one paper from B3/B4	2Hours/week	2	50	20	30	20
	Project	CSCP-606	Project	8Hours/week	4	100	0	100	40
Skill Enhancement Course (SEC-1)	Seminar	CSC-JOC-607	Seminar	4Hours/week	4	50	20	30	20
	Job Oriented Soft Skills	CSC-VOC-608	Leadership Skill Development	4Hours/week	4	50	20	30	20

				40	30	700	200	500	280
Total Credits for Semester III : 30 (Theory : 20 ; Laboratory : 10)										



B.Sc. Computer Science

(Honours)

Semester - V

Course code: CSCA-501 **Course Title: Introduction to Big Data**

Learning Objectives

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSqlapReduce.
- To teach the fundamental techniques and Principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real- world problems in for decision support.

Learning Outcomes

On completion of the course, the students will be able to:

- Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
- Acquire fundamental enabling techniques and scalable.
- algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
- Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
- Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

Course Outline

Unit -1 Introduction to Big Data, Characteristics of Data, and Big Data Evolution of Big Data,

Definition of Big Data, Challenges with big data, Why Big data? Data Warehouse environment, Traditional Business Intelligence versus Big Data. State of Practice in Analytics, Key roles for New Big Data Ecosystems, Examples of big Data Analytics.

Unit -2 Analytical Theory and Methods: Clustering and Associated Algorithms, Association Rules, Apriori Algorithm.

Unit -3 Applications of Association Rules, Validation and Testing, Diagnostics, Regression, Linear Regression, Logistic Regression, Additional Regression Models.

Unit -4 Test and Tutorial

Reference Books

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2 Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
4 Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
5 Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
6 Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press,2012.

Course code: CSCB-502 **Course Title: Numerical Methods M-2**

Prerequisites:

Basic knowledge of Mathematics.

Learning Objectives

- A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology, state important facts resulting from their studies.
- A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- Students get familiar with numerical analysis.

Learning Outcomes

Upon successful completion of the course, the students will be able to:

- Different number theory algorithms.
- Calculate approximate value for using approximation techniques.
- Solve numerical problems using different numerical methods.
- Write algorithms of different numerical techniques.

Unit – I

Introduction: Mathematical Modeling, Characteristics, Error in Calculatio, Significant Error , Absolute, Percentage Relative Error, Chopping off and Rounding off Error, Truncation Error, Propagation Error.

Divisibility Theory in the Integer:

Early Number Theory,The division Algorithm, Greatest Common divisor, The Euclidean Algorithm,

Unit- II

Numerical Solutions of Transcendental Equations:

Introduction and Matrix Notation of set of Equations, Gauss Elimination Method, Gauss Seidal Method, Matrix Inversion Method

Unit-III

Introduction and Polynomial Interpolation, Newton-Gregory Forward Difference Interpolation Formula, Newton-Gregory Backward Difference Interpolation Formula

Unit- IV

Newton's divided Difference Interpolation, Lagrange's Interpolation

UNIT – V Test and Tutorial

Reference Books:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.
2. Introductory Methods of Numerical Analysis by S. S. Sastry
3. Elementary Number Theory by David M. Burton
4. Numerical methods -S.C.Chapra, R.P.Canale-McGraw Hill
5. Numerical methods-E.Balguruswamy

Course Code: CSCA-501P **Course Title:** Practical based on CSCA-501

Sample List of Experiments and Tutorials to be carried out based on the course. CSCA-501P. (Introduction to Big Data)

Course Code: CSCB-502P **Course Title :** Practical based on CSCB-502

1. Program in C for representation of, Bisection Method
2. Program in C for representation of, False Position Method
3. Program in C for representation of, Newton-Raphson Method
4. Program in C for representation of, Gauss Elimination Method
5. Program in C for representation of, Matrix Inverse Method
6. Program in C for representation of. Newton-Gregory Forward Difference Interpolation Formula
7. Program in C for representation of, Newton-Gregory Backward Difference Interpolation Formula
8. Program in C for representation of Newton's divided Difference Interpolation
9. Program in C for representation of Lagrange's Interpolation



Course code: CSCS-503 **Course Title: Software Engineering**

Course Objectives

- To study Software Development Life Cycle, Development models and Agile Software development.
- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
- To learn the process of improving the quality of software work products.

Learning Outcomes

After learning the course the students should be able to:

- Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
- Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
- Recognize how to ensure the quality of software product, different quality standards and software review techniques.

Course Outline

Unit – 1 Introduction to Software and Software Engineering

The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component - Based Development, Process, Product and Process.Agility and Agile Process model, Extreme Programming, Other process models of Agile Development and Tools.

Unit - 2 Managing Software Project

Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool), Project Scheduling & Tracking, Risk Analysis & Management (Risk Identification, Risk Projection, Risk Refinement , Risk Mitigation). Understanding the Requirement, Requirement Modelling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering. Design Concepts and Design Principal, Architectural Design,Component Level Design, User Interface Design, Web Application Design.

Unit - 3 Software Coding & Testing

Coding Standard and coding Guidelines, Code Review, Software Documentation, Testing Strategies, Testing Techniques and Test Case, Test Suites Design, Testing Conventional Applications, Testing Object Oriented Applications, Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner). Quality Concepts and Software Quality Assurance, Software Reviews (Formal Technical Reviews), Software Reliability, The Quality Standards: ISO 9000, CMM, Six Sigma for SE, SQA Plan.

Unit - 4 Software Maintenance and Configuration Management

Types of Software Maintenance,The SCM Process,Identification of Objects in the Software Configuration, DevOps: Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions, What is DevOps?, DevOps Importance and Benefits, DevOps Principles and Practices, 7 C's of DevOps Lifecycle for Business Agility, DevOps and Continuous Testing, How to Choose Right DevOps Tools, Challenges with DevOps Implementation, Must Do Things for DevOps, Mapping My App to DevOps

Unit - 5 Test and Tutorial

Reference Books:-

1. Roger S.Pressman, Software Engineering- A practitioner's Approach, McGraw-Hill International Editions
2. Ian Sommerville, Software engineering, Pearson education Asia

3. Pankaj Jalote, Software Engineering – A Precise Approach Wiley
4. Behhforoz& Frederick Hudson, Software Engineering Fundamentals, OXFORD
5. Rajib Mall, Fundamentals of software Engineering, Prentice Hall of India.
6. Deepak Gaikwad, Viral Thakkar, DevOps Tools from Practitioner's ViewPoint, Wiley
7. Merlin Dorfman (Editor), Richard H. Thayer (Editor) ,Software Engineering

Course Code: CSCS-503P **Course Title :** Case Study

Students should carry out a case study on implementation of software Engineering concepts the SDLC they learned in the Software Engineering theory paper.



Course code: CSCAA-504 **Course Title: A1: Advanced JAVA**

Prerequisites:-Knowledge of core Java Programming

Learning Objectives:-

- To understand the Advanced Java features& Programming.

Learning Outcomes

On completion of the course, the students will be able to:

- Implement Networking and Data base connectivity in Java for given application.
- Implement webpage with dynamic content and server side web application using Servlet and JSP.
- Use web application framework JSF to build user interfaces.
- Apply Model-View-Controller architecture to build complex
- client-server applications.

Course Outline

Unit – 1: JDBC

JDBC Introduction JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, creating simple JDBC Application, Types of Statement (Statement Interface, PreparedStatement, CallableStatement), Exploring ResultSet Operations.

Socket Programming: URL class, InetAddress class, URLConnection class, DataGramSocket class, client side & Server side program

Unit – 2: Overview of Applet &Servlet API

Applet: Applet life cycle, applet tag, param tag, Graphics class, applet program, awt package.

Servlet API : Servlet Interface, GenericServletHttpServlet, Servlet Life CycleServlet, Example How servlet works? ServletRequest, ServletResponse,Servlet Collaboration RequestDispacher, Attribute in ServletSessionTracking, SessionTechniques, Cookies in ServletCookies: Login & Logout,.

Unit – 3:JSP

Java Server Pages Introduction to JSP , Comparison with Servlet, JSP Architecture, JSP: Life Cycle, Scripting Elements, Directives, Action Tags, Implicit Objects, Expression Language(EL), JSP Standard Tag Libraries(JSTL), JST tags :Function Tags, Formatting Tags, XML Tags, SQL tags .

Unit -4 : JSP Standard Tag Libraries(JSTL)

Struts2 IntroductionWhat is Struts Struts2 FeaturesModel1 vs Model2Struts 2Core ComponentsInterceptorsValue,StackAction,ContextAction,InvocationOGNLStruts 2 Architecture

Unit– 5 Test and Tutorial

Reference Books :

1) Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath "

2) Complete Reference J2EE by James Keogh mcgraw publication

3) Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication

4) SCWCD, Matthew Scarpino, Hanumant Deshmukh, Jignesh Malavie, Manning publication

5) Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication

6) Java Persistence with Hibernate by Christian Bauer, Gavin King

7) Spring in Action 3rd edition , Craig walls, Manning Publication

8) Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication

9) Java Server Faces in Action, Kito D. Mann, Manning Publication

10) JDBCTM API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley

11) Beginning JSP, JSF andTomcat, Giulio Zambon, Apress

12) JSF2.0 CookBook, Anghel Leonard, PACKT publication

Course code: CSCAA-504 **Course Title: A2: PHP**

Prerequisites

- Basic Programming knowledge and Logical skills
- Knowledge of HTML
- Basic SQL knowledge.

Course Objectives

- To install and configure MySQL
- o install and configure Apache with PHP
- To create MySQL users and grant privileges
- To test PHP and MySQL installations
- To configure PHP

Learning Outcomes

After completion of this course, the learners will be able to:-

- Analyze the construction of a web page and relate how PHP and HTML combine to produce the web page.
- Compare and contrast PHP variable types, and relate the advantages and disadvantages of PHP variables with local or global scope.
- Formulate, design and create PHP control structures, including selection and iterative structures.
- Learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL
- Learn how databases work and how to design one, as well as how to use php MyAdmin to work with MySQL.
- Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.

Course Outline

Unit – 1: Introduction to PHP

Evaluation of PHP, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression. Decisions and loop, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html. Function: What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function.

Unit – 2: Array

Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function. Handling Html Form with PHP, Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.

Unit – 3: Working with file and Directories

Understanding file & directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading

Session and Cookie : Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies, with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.

Unit – 4: Database Connectivity with MySQL

Introducing Database and SQL: Basics of MySQL, Connecting to the Database Server, Creating Database, Creating Table.
Retrieving data: Limit the number of results returned, Order and group results, Query multiple tables at once, Use various MySQL functions and other features to build more flexible queries

Manipulating data from SQL with PHP: Inserting new records into tables using INSERT statements, changing field values within records with UPDATE statements, deleting records using DELETE statements.

Unit – 5: Test and Tutorial

Reference Books

1. Learning PHP, MySQL, books by ' O' riley Press.
2. Teach Yourself PHP in 24 Hours, 3rd edition, Matt Zandstra, Sams Publishing
3. Beginning PHP, Apache, MySQL Web Development by Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore.
4. Beginning PHP and MySQL, 4 th Edition, W. Jason Gilmore, Apress, 2010
5. Teach yourself PHP, MySQL and Apache All in One , 5 th Edition, Julie C. Meloni,Pearson Education,2012

List of Software/Learning Websites

Software: WAMP server / XAMPP server, 'C' Panel, Text Editor

1. http://www.codecademy.com/tracks/web ,
2. http://www.codecademy.com/tracks/php
3. http://www.w3schools.com/PHP
4. http://www.tutorialpoint.com
5. .http://www.homeandlearn.co.uk



Course Code: CSCAA-504P XXA1 **Course Title : Practical based on Advanced Java**

1. Implement java applet to print "Hello" word.
2. Implement java applet to draw different shapes.
3. Implement java code use of jdbc statements.
4. Implement java program to connect database using DSN
5. Implement java program to print computer IP address
6. Write a java program to communicate client side and server side socket
7. Implement cookies to store firstname and lastname using Java server pages.
8. Program to demonstrate use requestdipatcher using jsp/servlet.
9. Write a Servlet program to print system date and time.
10. Write JSP code to implent JSTL tag structure

Course Code: CSCAA-504P XXA2 **Course Title : Practical based on PHP**

1. Simple Script

a. Write a PHP script to display Welcome message.
b. Write a PHP script to demonstrate arithmetic operators,
c. comparison operator, and logical operator.
d. Write PHP Script to print Fibonacci series.
e. Write PHP Script to generate result and display grade.
f. Write PHP Script to find maximum number out of three given numbers.

2. Function script

a. Write PHP script to demonstrate Variable function.
b. Write PHP script to obtain 5! Using function
c. Write PHP script to demonstrate string function.
d. Write PHP script to demonstrate Date functions.
e. Write PHP script to demonstrate Math functions.
f. Write PHP script to demonstrate Array functions.
g. Write PHP script to demonstrate File functions.

3. PHP Pages

a. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
b. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.

4. Demo Scripts

a. Write two different PHP script to demonstrate passing variables through a URL.
b. Write two different PHP script to demonstrate passing variables with sessions.
c. Write PHP script to demonstrate passing variables with cookies.
d. Write a program to keep track of how many times a visitor has loaded the page.
e. Write an example of Error-handling using exceptions.

5. Script using MYSQL

a. Write a PHP script to connect MySQL server from your website.
b. Write a program to read customer information like cust_no, cust_name, Item_purchase, and mob_no, from customer table and display all these information in table format on output screen.
c. Write a program to edit name of customer to "Bob" with cust_no =1, and to delete record with cust_no=3.
d. Write a program to read employee information like emp_no, emp_name, designation and salary from EMP table and display all this information using table format.
e. Create a dynamic web site using PHP and MySQL.

Web References

https://www.studocu.com/in/document/gujarat-technological-university/web-programming/web-development-practical-10-php-with-mysql/31503786



Course code: CSCAB-505 **Course Title: B1. Data Mining**

Prerequisites :- Basic Knowledge of Programming,Data Base Management System etc

Learning Objectives

- It introduces the basic concepts, principles,methods, implementation techniques, and applications of data mining, with a focus on two major data mining functions: (1) pattern discovery and (2) cluster analysis.
- to learn concepts, principles, and skills to practice and engage in scalable pattern discovery methods on massive data; discuss pattern evaluation measures.
- you will learn concepts and methodologies for cluster analysis, which is also known as clustering, data segmentation, or unsupervised learning.
- It focus on the in-depth study of the major data mining functions.

Learning Outcomes

After learning the course the students should be able to:

- Perform the preprocessing of data and apply mining techniques on it.
- Identify the association rules, classification, and clusters in large data sets.
- Solve real world problems in business and scientific information using data mining.
- Use data analysis tools for scientific applications.
- Implement various supervised machine learning algorithms.

Course Outline

Unit – 1 Introduction to data mining (DM): Motivation for Data Mining - Data MiningDefinition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process

Unit – 2 Data Pre-processing: Data summarization, data cleaning, data integration andtransformation, data reduction, data discretization and concept hierarchy, generation, feature extraction , feature transformation, feature selection, introduction to Dimensionality Reduction, CUR decomposition

Unit - 3 Concept Description, Mining Frequent Patterns, Associations and Correlations: What is concept description? - Data Generalization and summarization- based characterization - Attribute relevance - class comparisons, Basic concept, efficient and scalable frequent item-set mining methods, mining various kind of association rules, from association mining to correlation analysis, Advanced Association Rule Techniques, Measuring the Quality of Rules.

Unit - 4 Classification and Prediction: Classification vs. prediction, Issues regarding classification and prediction, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree- Based Algorithms, Neural Network-Based Algorithms, Rule-Based Algorithms, Combining Techniques, accuracy and error measures, evaluation of the accuracy of a classifier or predictor. Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner / WEKA / DTREG DM Tools

Unit - 5 Test and Tutorial

Reference Books:-

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2. M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.
3. M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
4. Ning Tan, Vipin Kumar, Michael Steinbanch Pang, "Introduction to Data Mining", Pearson

Course code: CSCAB-505 **Course Title: B2. Theory of Computation**

Prerequisites

1. Basic Knowledge of Programming Languages, Data Structures and Algorithms

Learning Objectives

- Theory of computation teaches how efficiently problems can be solved on a model of computation, using an algorithm.
- It is also necessary to learn the ways in which computer can be made to think.
- Finite state machines can help in natural language processing which is an emerging area.

Learning Outcomes

After the completion of course, the student should be

- Apply the knowledge of automata theory, grammars & regular expressions for solving the problem
- Analyse the give automata, regular expression & grammar to know the language it represents
- Design Automata & Grammar for pattern recognition and syntax checking
- At the end of the course the students will be able to understand the basic concepts and application of Theory of Computation.
- Students will apply this basic knowledge of Theory of Computation in the computer field to solve computational problems and in the field of compiler also.

Course Outline

Unit – 1 : Review of Mathematical Theory: Sets, Functions, Logical statements, Proofs, relations, languages, Mathematical induction, strong principle, Recursive definitions,

Unit - 2 : Regular Languages and Finite Automata: Regular expressions, regular, languages, applications, Automata with output-Moore machine, Mealy, machine, Finite automata, memory requirement in a recognizer, definition, union, intersection and complement of regular languages.Non Determinism Finite Automata, Conversion from NFA to FA, - Non Determinism Finite Automata Conversion of NFA- □ to NFA and equivalence of three Kleene's Theorem, Minimization of Finite automata Regular And Non Regular Languages – pumping lemma

Unit – 3 : Context free grammar (CFG): Definition, Unions Concatenations And Kleen's of Context free language Regular grammar, Derivations and Languages, Relationship between derivation and derivation trees, Ambiguity Unambiguous CFG and Algebraic Expressions BacosNaur Form (BNF), Normal Form – CNF

Unit – 4 : Pushdown Automata, CFL And NCFL: Definition, deterministic PDA, Equivalence of CFG and PDA, Pumping lemma for CFL, Intersections, and Complements of CFL, Non-CFL

Unit– 5 : Test and Tutorial

Books Recommended:

1. An introduction to automata theory and formal languages By Adesh K. Pandey, Publisher: S.K. Kataria & Sons
2. Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc
3. Computation: Finite and Infinite By Marvin L. Minsky Prentice-Hall
4. Compiler Design By Alfred V Aho, Addison Weslley
5. Introduction to the Theory of Computation By Michael Sipser

Course Code: CSCAB-505P **Course Title : Practical based on CSCAB-505.B1**

Sample List of experiments to be carried out based on the course CSCAB-505.B1 (Data Mining)

Laboratory work will be based on the above syllabus CSCAB-505.B1 **(Data Mining)** with minimum 10 experiments to be incorporated.

Course Code: CSCAB-505P **Course Title : Practical based on CSCAB-505.B2**

Sample List of experiments to be carried out based on the course CSCAB-505.B2 (Theory of Computation)

01 Design a Finite State Machine (FSM) that accepts all strings over input symbols {0, 1} having three consecutive 1's as a substring.

02 Design a Finite State Machine (FSM) that accepts all strings over input symbols {0, 1} which are divisible by 3.

03 Design a Finite State Machine (FSM) that accepts all decimal string which are divisible by 3.

04 Design a Push Down Automata (PDA) that accepts all string having equal number of 0's and 1's over input symbol {0, 1} for a language 0^n1^n where n >= 1.

05 Design a Program to create PDA machine that accept the well-formed parenthesis.

06 Design a PDA to accept WCW^R where w is any binary string and W^R is reverse of that string and C is a special symbol.

07 Design a Turing Machine that calculate 2's complement of given binary string.

08 Design a Turing Machine which will increment the given binary number by 1.

09 Design a Turing Machine that's accepts the following language $a^nb^nc^n$ where n>0.

10 Design a Turing Machine to accept W^R where w is any binary string and W^R is reverse of that string.

Course code: CSC-JOC-506 **Course Title: Aptitude and Reasoning**

Prerequisites

Fundamental knowledge of Mathematics

Learning Objectives

This course is designed to suit the need of the outgoing students and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning during various examinations and campus interviews.

Learning Outcomes

On successful completion of the course the students will be able to:

- Understand the basic concepts of quantitative ability
- Understand the basic concepts of logical reasoning Skills
- Acquire satisfactory competency in use of reasoning
- Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
- Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

Course Outline

Unit -1 : Quantitative Ability: LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers

Unit -2 : Quantitative Ability : Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance,Time & Work, Ratio and Proportion, Area

Unit -3 : Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams

Unit -4

Logical Reasoning: Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Seating Arrangement

Unit -5 Test and Tutorial

Reference Books:

- A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
- Analytical and Logical reasoning By Sijwali B S
- Quantitative aptitude for Competitive examination By R S Agarwal
- Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4 th edition
- Quantitative Aptitude & Data Interpretation – Disha Expert
- Quantitative Aptitude for Competitive Examinations – Dinesh Khattar
- Fast Track Objective Arithmetic – Rajesh Verma
- Logical Reasoning and Data Interpretation for CAT by Pearson

Course code: CSC-VOC-507 **Course Title: Personality Development**

Prerequisites

To get full benefit of this course, student needs to have basic idea about traits of Personality Development

Learning Objectives

- The course intends to develop talent, facilitate employability enabling the incumbent to excel and sustain in a highly competitive world of business.
- The programme aims to bring about personality development with regard to the different behavioural dimensions that have far reaching significance in the direction of organisational effectiveness.
- To make students know about self-awareness, life skills, soft skills, need for personal development etc.

Learning Outcomes

- The students will be able to perform well on social ground.
- To help the student to be creative, and analytical.
- To develop their own specific skills.
- Polishing manners to behave appropriately in professional circles.
- Developing and maintaining optimistic nature.
- Understanding the art of entertaining.

Course Outline

UNIT- I

Personality & Personal Grooming – A Brief Introduction to Personality and self-concept, Element of Personality, Determinants of Personality, Causes of deranged Personality, Personality Analysis.

Grooming, Personal hygiene, Social, Business and Dining Etiquettes, Body language use and misuse, Art of good Conversation, Art of Intelligent Listening.

UNIT- II

Interpersonal Skills & Role playing: Dealing with seniors, colleagues, juniors, customers, suppliers, contract workers, owners etc. at work place

UNIT- III

Group Discussion & Presentation skills: Team behavior, how to effectively conduct yourself during GD, do's and don'ts, clarity of thoughts and its expression. Presentation skills & seminar skills

UNIT- IV

Interviews Preparation: Intent and purpose, selection procedure, types of interviews, Self planning, writing winning resume, knowledge of company profiles, academics and professional knowledge review, update on current affairs and possible questions, time – keeping, grooming, dress code, document portfolio, frequently asked questions and their appropriate answers, self – introduction, panel addressing, mental frame – work during interviews

REFERENCE BOOKS

(1) Personal management and Human Resources, by C.S. Venkata Ratanam and B.K. Srivastava, Published by Tata McGraw Hill Publishing Ltd. New Delhi
(2) Human Behaviour at Work, by: Keith Davis, Tata McGraw Hill Pub. Ltd. N. Delhi
(3) Im OK, You re OK, by : Thomas A. Harris, Publsihed By : Pan Books, London and Sydney
(4) Pleasure of your Company, by : Ranjana Salgaocar, Published By : Pyramid Publishers, Goa
(5) How to get the job you want, by : Arun Agarwal, Published By : Vision Books, New Delhi

(6) Get That Job, Rohit Anand & Sanjeev Bikhachandani, Harper Collins

B.Sc. Computer Science

(Honours)

Semester - VI

Course code: CSCA-601 **Course Title: A1: Java Web Frameworks**

Prerequisites: -Knowledge of core Java Programming& Servlet and JSP

Learning Objectives: -

- To understand the Advanced Java web Frameworks & MVC mapping.

Learning Outcomes

On completion of the course, the students will be able to:

- Implement MVC structure & its types in Java Web application.
- Understand use of Struct web frame work in web site development
- Use web application framework JSF to build user interfaces.
- Apply Model-View-Controller architecture to build complex client-server applications using hibernate and Spring boot.

Course Outline

Unit – 1: Java Web Frameworks: Struct2

Struts2 Introduction What is Struts, Struts2 Features, **MVC** Model1 vs Model2,Struts2Core Components, Interceptors Value, Stack Action, Context Action, Invocation OGNL Struts 2 Architecture

Unit – 2:Java Server Faces2.0

Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event Handling and Database Access, JSF Libraries: PrimeFaces

Unit – 3: Hibernate 4.0

Overview of Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate O/R Mapping, Hibernate Annotation, Hibernate Query Language(HQL)

Unit -4: Spring MVC & Spring Boot

Overview of Spring, Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect – oriented Spring, Managing Database, Managing Transaction, Introduction to Spring Boot, Spring vs Spring Boot vs Spring MVC, SB Architecture.

Unit– 5 Test and Tutorial

Books Recommended:

1. Black Book " Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath"
2. Complete Reference J2EE by James Keogh mcgraw publication
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication
4. Struct 2 in Action by DONALD BROWN Chad, michael ,davis Scott stanlick, Manning Publication
5. Java Persistence with Hibernate by Christian Bauer, Gavin King
6. Spring in Action 3rd edition , Craig walls, Manning Publication
7. Java Server Faces in Action, Kito D. Mann, Manning Publication
8. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley

List of learning website references:

1. https://www.javatpoint.com
2. https://www.geeksforgeeks.org

Course code: CSCB-602 **Course Title: Web Fundamentals**

Prerequisites

1. Basic Knowledge of Programming Languages and Computer hardware, software is also necessary.

Course Objectives

- The student will be able to
- Define the principle of Web page design
- Define the basics in web design
- Visualize the basic concept of HTML.
- Recognize the elements of HTML.
- Introduce basics concept of CSS.
- Develop the concept of web publishing

Course Outcomes

- Develop web page using which uses HTML and CSS tags and intrinsic event attributes.
- Each student will individually build and publish a web site.

Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors.

Course Outline

Unit - 1 Web Design Principles

Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page, Layout, Design Concept. Basics in Web Design - Brief History of Internet, What is World Wide Web ? Why create a web site ?Web Standards, Audience requirement.

Unit – 2 Introduction to HTML

What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags., Elements of HTML, Introduction to elements of HTML- Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit - 3 Introduction to Cascading Style Sheets

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding, Properties, Margin properties),CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

Unit – 4 Introduction to Web Publishing or Hosting

Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Unit - 5 Test and Tutorial

Text Books

1. HTML 5 in simple steps, Kogent Learning Solutions Inc., Dreamtech Press
2. Creating a Web Page and Web Site, Murray,Tom/Lynchburg, College,2002

Reference Books

1. HTML, XHTML, and CSS Bible, 5ed, Steven M. Schafer, Wiley India
2. An Introduction to web Design and Programming –Wang-Thomson
3. Beginning Web Programming-Jon Duckett WROX.

Free E-Books

1. https://www.pdfdrive.com/web-development-books.html

Course Code: CSCA-601P **Course Title : Practical based on Java Web Frameworks**

Sample List of experiments to be carried out based on the course **CSCA-601. (Java Web Frameworks)**

1. Write steps to create struct 2 application.
2. Implement simple JSF Application
3. Write code to demonstrate JSF UI Components Example.
4. Implement simple JSF Application.
5. Program to implement basic hibernate structure
6. Implement use of HQL in Hibernate.
7. Create web application using Hibenate
8. Write steps to create spring application.
9. Write steps to create spring mvc application.
10. Write steps to create spring boot application.

Course Code: CSCA-602P **Course Title : Practical based on Web Designing**

Sample List of experiments to be carried out based on the course **CSCA-602. (Web Designing)**

1. Acquaintance with elements, Tags and basic structure of HTML files.

2. Practicing basic and advanced text formatting.

3. Practicing use of multimedia components (Image, Video & Sound) in HTML document.

4. Designing of webpage-Document Layout.

5. Designing of webpage-Working with List.

6. Designing of webpage-Working with Tables.

7. Practicing Hyper linking of webpages.

8. Designing of webpage-Working with Frames.

9. Designing of webpage-Working with Forms and Controls.

10. Acquaintance with creating style sheet, CSS properties and styling.

11. Working with Background, Text and Font properties.

12. Working with List properties

13. Working with HTML elements box properties in CSS

14. Working with Positioning and Block properties in CSS

15. Designing with cascading style sheet-Internal style sheet

16. Designing with cascading style sheet-External style sheet

Course code: CSCS-603 **Course Title: A1.Software Quality Assurance & Testing**

Learning Objectives

- To understand the basic view of software quality and quality factors.
- To understand the Software Quality Assurance (SQA) architecture and the details of its components.
- To understand of how the SQA components can be integrated into the project life cycle.
- To be familiar with the software quality infrastructure

Learning Outcomes

On completion of the course, the students will be able to:

- Utilize the concepts in software development life cycle.
- Demonstrate their capability to adopt quality standards.
- Assess the quality of software product.
- Apply the concepts in preparing the quality plan & documents.

Course Outline

Unit – 1: Introduction to software Quality and Assurance, The software quality challenge, Software quality, Software quality factors, Management and its role in software quality assurance, Components of SQA, The components of the software quality assurance system – overview, Pre-project Software Quality Components, Contract review, Development and quality plans.

Unit – 2 : SQA Components in the Project Life Cycleand Strategies, Integrating quality activities in the project life cycle, Reviews, Software testing – strategies

Unit – 3 : Software Testing – Implementation: Software Quality Implementation, Assuring the quality of software maintenance components, Assuring the quality of external participants' contributions, CASE tools and their effect on software quality

Unit – 4 : Software Quality Infrastructure Components Procedures and work instructions, Staff training and certification,Corrective and preventive actions, Documentation control, Software Quality Metrics, Software Quality metrics, Cost of Quality

Unit– 5: Test and Tutorial

Reference Books :

1) Quality and Management Standards (ISO, CMMi, ISO/IEC, IEEE, EIA).
2) KshirsagarNaik and PriyadarshiTripathy, Software Testing & Quality Assurance-Theory and Practice, Wiley Student edition
3) William E. Perry, Effective Methods for Software Testing, WILLEY, . 3rd Edition
4) Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997.
5) M G Limaye, Software Testing, Tata McGraw-Hill Education, 2009



Course Code: CSCS-603P **Course Title : Practical based on Software Quality Assurance & Testing**

List of Experiments: Software Quality Assurance & Testing

Part 1: Test Planning
a) Prepare Quality Plan for any Application like online shopping etc.
b) Prepare Test Plan for any Application like Railway Reservation System etc.

Output: Test plan and Quality Plan

Part 2: Software Testing
a) Create Test cases (Unit, Integration, System and Acceptance Test Cases) for Application
b) Perform manual testing using test case created and prepare test Metrics.

Part 3: Software Testing
Test automation – script creation and execution.
Tools: Selenium

1. Open URL in different browsers (Chrome, Firefox, IE)
2. Perform mouse hovers and other events
3. To take snapshots.
4. Getting current time-stamp
5. To Handle a drop-down.
6. Handling 2 3 steps at a time like Website Registration+login+logout at a time in single run.
7. To Upload File.
8. Storing and fetching data from excel (E.g Registration data)
9. Radio button selection.
10. Checkbox Selection



Course code: CSCS-604 **Course Title: A3. Cloud Computing**

Prerequisites:

Student must know basics of Computer Network and Parallel & Distributed Computing

Learning Objectives

- To provide students with the fundamentals and essentials of Cloud Computing.

Learning Outcomes

On completion of the course, the students will be able to:

- To learn and understand basic concepts of Cloud Computing & its Models.
- To learn and understand Cloud Technologies
- To design, develop and deploy Cloud applications
- To get acquainted with the challenges and security aspects of Cloud Computing.

Course Outline

Unit 1: UNIT I: - Introduction to Cloud Computing

Cloud Computing Security, Cloud Computing Challenges, Benefits, and Limitations.
Cloud Computing Fundamentals: Introduction, Layers of Cloud Computing, Types of Cloud Computing: Public, Private, Hybrid cloud.
Cloud Services: Infrastructure as a Service(IAAS), Platform As a Service(PAAS), Software As a Service (SAAS). Enabling Technologies, Cloud Computing Features

Unit 2: Cloud Computing Technologies and Applications:
Cloud Computing: IT as a Service, Cloud Computing Security, Cloud Computing Model Application Methodology, Cloud Computing in Development/Test
Key Enabling Technologies for Virtual Private Clouds: Virtual Private Clouds,Virtual Data Centers and Applications.

Unit 3: Cloud Infrastructure:
Historical Perspective of Data Centers,
Datacenter Components: IT Equipment and Facilities
Design Considerations: Requirements, Power, Efficiency, & Redundancy, Power and Challenges in Cloud Data Centers.

Unit 4: Virtualization & Security in the Cloud
Virtualization: Introduction to virtualization, Hypervisor: Type-I & Type II, Types of Virtualization, Pros and cons of virtualization, **Security:** Cloud Security, cloud Security Challenges.

Unit– 5: Test and Tutorial

Reference Books:

1. Cloud Computing Bible by Barrie Sosinsky
2. Cloud Computing Handbook
3. Mastering Cloud Computing Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi



Course code: CSCS-605 **Course Title: A4. Cyber Security**

Prerequisites:

Networking & Operating System

Learning Objectives

- Understand the importance and basic concepts of cybersecurity.
- Identify and analyze various types of cyber threats.
- Apply network and operating system security principles.
- Implement cryptographic techniques and address ethical issues in cybersecurity.

Learning Outcomes

After Completion of the Course students will be able to

- Grasp and articulate the importance and fundamental concepts of cybersecurity.
- Recognize and evaluate various types of cyber threats.
- Effectively implement network and operating system security principles.
- Utilize cryptographic techniques and navigate ethical issues in cybersecurity.

Course Outline

Unit -I: Foundations of Cybersecurity (10 Periods)

Overview of Cybersecurity, Importance of Cybersecurity, History of Cyber Attacks, Basic Concepts and Terminology (Threats, Vulnerabilities, Risk).

Unit 2: Types of Cyber Threats (10 Periods)

Malware: Viruses, Worms, Trojans, Phishing and Social Engineering, Ransomware and Advanced Persistent Threats (APTs)

Unit 3: Network and Operating System Security (10 Periods)

Fundamentals of Network Security, Firewalls, VPNs, and IDS/IPS, Secure Network Design, OS Security Principles (Windows, Linux), User and File System Security

Unit 4: Cryptography and Ethical Considerations (10 Periods)

Introduction to Cryptography, Symmetric vs. Asymmetric Encryption, Hash Functions and Digital Signatures, Ethical Hacking and Legal Implications, Privacy and Data Protection Laws.

Unit– 5: Test and Tutorial

Reference Books:

1. "Cybersecurity for Beginners" by Raef Meeuwisse (Chapters 1-2)
2. "The Art of Deception" by Kevin Mitnick (Chapters 1-3)
3. "Network Security Essentials" by William Stallings (Chapters 1-3)
4. "Practical UNIX and Internet Security" by Simson Garfinkel and Gene Spafford (Chap. 2-4)
5. "Cryptography and Network Security" by William Stallings (Chapters 2-4)
6. "Hacking Exposed" by Stuart McClure, Joel Scambray, and George Kurtz (Chap. 1-2)



Course code: CSCAB-605 **Course Title: B3. Data Warehouse**

Learning Objectives

- To understand the need of Data Warehouses.
- To conceptualize the architecture of a Data Warehouse.
- To Learn Data Warehouse Technologies.
- To understand the need for Data Warehouse.

Learning Outcomes

On completion of the course, the students will be able to:

- Learn and understand the usage, need and cost of Data Warehouse
- Learn various techniques for Data Warehouse.
- Understand Market Basket Analysis.

Course Outline

Unit – 1: Introduction to Data Warehousing : The modern Data warehouse, Data Warehouse roles and structure, need of Data warehouse, The cost of Warehousing Data, Foundation of Data mining,The roots of Data Mining, The Approach to Data Exploration and Data Mining.

Unit – 2 : The Data Warehouse: Stores, Warehouses and Marts, the Data Warehouse Architecture, Metadata, Metadata Extraction, Implementing Data Warehouse, Data Warehouse technologies.

Unit – 3: Data Mining: What is Data Mining, Online Analytical Processing, Techniques used to mine the data, Market Basket Analysis, Limitations and challenges to DM.

Unit–4 :Data Analysis and Visualization: Data Analysis: Correlation, Covariance, Rank and Percentile, Histogram and Moving Average. Data Visualization with advance Charts: Stock Chart, Surface Chart, Donut Chart, Bubble Chart and Radar Chart.

Unit– 5: Test and Tutorial

Reference Books :

1. George M. Marakas, "Modern Data Warehousing, Mining and Visualization: Core Concepts", Pearson Education
2. Jiawei Han & Micheline Kamber, "Data Mining: Concepts & Techniques", Second Edition, Morgan Kaufmann Publishers
3. Alex Berson & Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw-Hill
4. Sam Anahory, Dennis Murray , "Data Warehousing in the real World", Pearson Education



Course Code: CSCAB-605 **Course Title: B4. IoT (Internet of Things)**

Prerequisites

- Fundamentals of computer network, web technology etc

Learning Objectives

- IoT market is growing rapidly from installed base of about 30 billion devices in the year 2020and expected to grow up to 75 billion devices by 2025.
- IoT is useful in many sectors like consumer, commercial, infrastructure, health, industry and military. Industry 4.0 is based on IoT.
- It provide opportunity to the students for contribution in IoT applications.

Learning Outcomes

On completion of the course, the students will be able to:

- Understand the vision of IoT from a global context.
- Understand the application of IoT.
- Determine the Market perspective of IoT.
- Use of Devices, Gateways and Data Management in IoT.
- Building state of the art architecture in IoT.
- Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Course Outline

Unit -1 IoT & Web Technology : The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

Unit -2 M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit -3 IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, **IoT Reference Architecture**- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

Unit -4IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects,

Unit -5 Test and Tutorial

Reference Books

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013

3. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Course code: CSCP-606 **Course Title: Major Project**

Pre-requisites : Software Engineering, Programming / Coding language, RDBMS etc

Learning OBJECTIVES:

- To solve industrial (or society or research) problems.
- To plan, schedule, and monitor the software project
- Development, coding, and testing of a large project cohesively.
- Documentation of project

Learning OUTCOMES:

Accomplishments of the student after completing the course:

- Doing the project will enable the student to go through rich experience in developing large projects. Such an experience will include encountering various technical issues, finding sources to resolve the issues and finally finding the solution of all these issues satisfactorily.
- Thinking analytically, analyzing, and synthesizing requirements and complicated nformation for getting a good comprehension of the solution methodology to be dopted.
- Ability to document and write well.
- It will prepare the students for analyzing and programming for industrial problem an large projects work in future.

Course Outline

Guidelines for Project

- It is recommended that the team should be about 2-3 students.
- The project should be free from plagiarism of any kind.
- Internal guides (i.e. The regular faculty members) must be allocated to projects.
- Project plan along with the division of work amongst teammates would have been prepared and got approved within a maximum of 5 days of the start of the project.
- Coding standards should be followed meticulously. At the minimum, the code should be self documented, modular, and should use the meaningful naming convention.
- It is advisable that object-oriented methodology is used with the reusability of classes and code, etc..
- The output reports must include MIS reports, if applicable.
- The documentation should include a chapter on "Learning during Project Work", i.e. "Experience of Journey during Project Duration".
- It is strongly recommended that Data structure/Database design is included in the report. At least portions of code (preferably full code) are mandatory. The student may be asked to write the code related to the project during the examination.
- If a student is compelled to follow certain instructions (by the external, i.e. organization's Guide) which he/she does not agree to, such a student must prepare a supplementary report to document his/her version and present it to the examiners if such a need arises.
- Internal guides (i.e. The regular faculty members) must devote the time allocated as per the timetable to guide the students for the project. The time allocation will be in accordance with the scheme for the 6th semester project as given.
- Internal guides should preferably visit external guide to track the project
- Project document should be printed on both sides of paper.
- Students are expected to upload project work on given web site as project repository of the department/institution.

Course Code: CSC-JOC-607 **Course Title: Seminar**

Guidelines for seminar

1. Seminar is to be independently delivered by each candidate.
2. The topic selected should be associated with current trends in computer field
3. A report is to be submitted before the presentation.
4. Presentation must be done using power point presentation/LibreOffice Impress/WPS Office Presentation.
5. The seminar presentation and the report are to be evaluated by the internal examiner of the department
6. Students are expected to upload the presentation and report on given web site as a repository of the Department.



Course Code: CA-641P (SEC-4 H)	Course Title: - Leadership Skill Development
Total Credit: 2	Marks: 50 (IA: 50)
Periods: 3 per week (50 Minutes each)	

Prerequisites:

There are no prerequisites for this course

Learning Objectives

1. To understand the concepts and theories of leadership.
2. To develop essential leadership skills, including communication, decision making, motivation, and conflict resolution.
3. To explore different leadership styles and their applications in various contexts.
4. To cultivate self-awareness and emotional intelligence as foundations for effective leadership.

Learning Outcomes

After Completion of the Course students will be able to

1. Demonstrate an understanding of leadership concepts, theories, and models.
2. Apply effective communication techniques in leadership roles.
3. Make informed decisions and solve problems as a leader.
4. Motivate and inspire individuals and teams towards shared goals.
5. Manage conflicts and navigate challenges in leadership positions.
6. Reflect on personal leadership strengths and areas for development.

Unit -I: Introduction to Leadership (10 Periods)

- Definition of leadership and its significance in personal and professional contexts
- Historical perspectives on leadership theories and models
- Traits vs. behaviors vs. situational approaches to leadership

Unit -II: Leadership Skills Development (10 Periods)

- Effective communication in leadership roles: listening, speaking, nonverbal communication
- Decision making and problem-solving techniques for leaders
- Motivation theories and strategies for inspiring individuals and teams
- Conflict resolution and negotiation skills for leaders

Unit -III: Leadership Styles and Applications (10 Periods)

- Different leadership styles: autocratic, democratic, transformational, servant leadership, etc.
- Situational leadership: adapting leadership styles to different contexts and followers
- Leading diverse teams and managing inclusivity in leadership

Unit -IV: Emotional Intelligence and Self-Awareness in Leadership (10 Periods)

- Understanding emotional intelligence and its role in effective leadership
- Self-awareness: assessing personal strengths, weaknesses, values, and leadership philosophy
- Managing emotions and building resilience as a leader
- Developing empathy and social skills in leadership roles

Unit-V: Test and Tutorials

Textbook

1. "Leadership: Theory and Practice" by Peter G. Northouse

References:

1. "The Leadership Challenge" by James M. Kouzes and Barry Z. Posner
2. "Primal Leadership: Realizing the Power of Emotional Intelligence" by Daniel Goleman, Richard Boyatzis, and Annie McKee
3. "Dare to Lead: Brave Work. Tough Conversations. Whole Hearts." by Brené Brown
4. "The 21 Irrefutable Laws of Leadership: Follow Them and People Will Follow You" by John C. Maxwell

E-Resources

1. https://www.ccl.org/leadership/education-resources/
2. https://www.ted.com/topics/leadership