DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/B.Sc./CBC & GS/17/2024

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies/Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 08 April 2024 has accepted the following Syllabi under the Faculty of Science & Technology as per Choice Based Credit Grading System** as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc. Chemistry (Optional)	Vth & VIth semester
2.	B.Sc. Analytical Chemistry (Optional)	Vth & VIth semester
3.	B.Sc. Polymer Chemistry (Optional)	Vth & VIth semester
4.	B.Sc.Biochemistry (Optional)	Vth & VIth semester
5.	B.Sc.Dairy Science & Technology (Optional)	Vth & VIth semester
6.	B.Sc.Microbiology (Optional)	Vth & VIth semester
7.	B.Sc. Botany (Optional)	Vth & VIth semester
8.	B.Sc. Computer Science (Optional)	Vth & VIth semester
9.	B.Sc. Computer Science (Degree)	Vth & VIth semester
10.	B.Sc.Information Technology (Optional)	Vth & VIth semester
11.	B.Sc.Information Technology (Degree)	Vth & VIth semester
12.	Bachelor of Computer Application (Optional)	Vth & VIth semester
13.	Bachelor of Computer Application (Degree)	Vth & VIth semester

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/ 1786-94
Date:- 21.06.2024.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
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.

Dr. Babasaheb Ambedkar Marathwada University

Chhatrapati Sambhajinagar- 431004(MS) India

Three Year Undergraduate Bachelor Degree Program
In Science and Technology

B. Sc. (Computer Science) Degree
III Year

Curriculum Structure and Scheme of Examination

Choice Based Credit System

(Effective from Academic Year 2024-25)

Question Paper Pattern for Theory

B. Sc. (Computer Science) Semester ----------
Course Code ----------
Paper Number ----------
Title of Paper ----------

Time : 1.30 Hrs. **Max Marks: 40**

N.B.
1. Attempt All Questions.
2. All questions carry equal marks.
3. Illustrate your answer with suitable labelled diagram.

Q.1. Multiple choice questions / Fill In the Blanks / Terms / Definition / One Line Answer questions. (10 Marks)

1)
2)
3)
4)
5)
6)
7)
8)
9)
10)

Q.2. Long answer question. (10 Marks)
OR
Long Answer question

Q.3. Long answer question (10 Marks)
OR
Short answer questions
a)
b)

Q.4. Short Notes on any TWO of the following:- (10 Marks)
a)
b)
c)
d)

Dr. Babasaheb Ambedkar Marathwada University,
Chhatrapati Sambhajinagar
Choice Based Credit System (CBCS) Curriculum
For
Faculty of Science and Technology
Course Structure (Third Year)

B. Sc. (Computer Science) Science Three Year Under Graduate Degree Program

Third Year

Course Type	Semester – V		Course Type	Semester - VI	
	Name of Paper	**Credit**		**Name of Paper**	**Credit**
Discipline Specific Elective-I (DSE-1A)	**DSE-1A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Advanced Java B1: VB.NET C1: Cloud Computing Foundation D1: C# Programming	**2**	**Discipline Specific Elective-IV (DSE-1B)**	**DSE-1B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Java Web Frameworks B1: ASP.NET C1: AWS (Amazon Web Services) D1: Neural Network	**2**
	DSE-1A (2) Select any one Paper from(A2/B2/C2/D2) A2: Theory of Computation B2: Data Mining C2: Advanced PHP D2: Block Chain	**2**		**DSE-1B (2)** Select any one Paper from(A2/B2/C2/D2) A2: Compiler Design B2: Data Warehouse C2: Distributed Database Management System D2: Deep Learning	**2**
	Lab based On DSE-1A(1)	**1.5**		Lab based On DSE-1B(1)	**1.5**
	Lab based On DSE-1A(2)	**1.5**		Lab based On DSE-1B(2)	**1.5**
Discipline Specific Elective-II (DSE-2A)	**DSE-2A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Software Engineering B1: Modelling & Simulation C1: Information &System Security D1: Natural language processing	**2**	**Discipline Specific Elective-V (DSE-2B)**	**DSE-2B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Software Quality Assurance & Testing B1: GIS and Remote Sensing C1: Ethical Hacking D1: Cryptography and Netwok Security	**2**
	DSE-2A (2) Select any one Paper from(A2/B2/C2/D2) A2: Shell Programming B2: Basic Data Science C2: Basic of Networking Protocols	**2**		**DSE-2B (2)** Select any one Paper from(A2/B2/C2/D2) A2: Linux Administration B2: Advance Data Science C2: Advanced Networking Protocols D2: Fuzzy System	**2**

	D2: Programming in SCILAB				
	Lab based On DSE-2A(1)	**1.5**		Lab based On DSE-2B(1)	**1.5**
	Lab based On DSE-2A(2)	**1.5**		Lab based On DSE-2B(2)	**1.5**
Discipline Specific Elective–III **(DSE–3A)**	**DSE-3A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Artificial Intelligence B1: E-Commerce C1: Software Project Management - I D1: Introduction to Big Data	**2**	**Discipline Specific Elective–VI** **(DSE–3B)**	**DSE-3B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Machine Learning B1: Cyber Crime & Mitigation C1: Software Project Management - II D1: Big Data Analytics	**2**
	DSE-3A (2) Select any one Paper from(A2/B2/C2/D2) A1: Android Programming B1: IoT (Internet of Things) C1: Power BI D1: Video Processing	**2**		**DSE-3B (2)** **Major Project**	**2**
	Lab based On DSE-3A(1)	**1.5**		Lab based On DSE-3B(1)	**1.5**
	Lab based On DSE-3A(2)	**1.5**		Seminar	**1.5**
Skill Enhancement Course (SEC-3) **2**	Any one skill to be chosen out of two **SEC-3(E):** Aptitude and Reasoning **SEC-3(F)**: Website Hosting using Word Press	**2**	**Skill Enhancement Course (SEC-4)** **2**	Any one skill to be chosen out of two **SEC-4(G):** Personality Development **SEC-4(H):** Digital Marketing	**2**
Non-Credit Course			**Non-Credit Course**		
Total Credit		**23**			**23**

Structure and Curriculum for
Bachelor of Science in (Computer Science)

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Choice Based Credit System (CBCS) Curriculum

For

Faculty of Science and Technology

Course Structure and Scheme of Examination

B. Sc. (Computer Science) Three Year Under Graduate Degree Program

Semester-V

Course Type	Course Code	Course Title	Total Periods (Teaching Periods / Week)	Credits	Scheme of Examination			
					UA	IA	Max Marks	Min Marks
Discipline Specific Elective–I (DSE–1 A)	CS- 511T	**DSE-1A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Advanced Java B1: VB.NET C1: Cloud Computing Foundation **D1:** C# Programming	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-512T	**DSE-1A (2)** Select any one Paper from(A2/B2/C2/D2) A2: Theory of Computation B2: Data Mining C2: Advanced PHP **D2: B**lock Chain	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-513P	Lab Course (based on CS-511T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-514P	Lab Course (based on CS-512T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Discipline Specific Elective – II (DSE – 2A)	CS-521 T	**DSE-2A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Software Engineering B1: Modelling & Simulation C1: Information &System Security D1: Natural language processing	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS- 522T	**DSE-2A (2)** Select any one Paper from(A2/B2/C2/D2) A2: Shell Programming	45 (3/per week)	**2**	**40**	**10**	**50**	**20**

		B2: Basic Data Science C2: Basic of Networking protocols D2: Programming in SCILAB						
	CS-523P	Lab Course (based on CS-521T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-524P	Lab Course (based on CS-522T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Discipline Specific Elective – III (DSE – 3A)	CS-531T	**DSE-3A (1)** Select any one Paper from(A1/B1/C1/D1) A1: Artificial Intelligence B1: E-Commerce C1: Software Project Management -I D1: Introduction to Big Data	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-532T	**DSE-3A (2)** Select any one Paper from(A2/B2/C2/D2) A1: Android Programming B1: IoT (Internet of Things) C1: Power BI D1: Video Processing	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-533P	Lab Course (based on CS-531 T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-534P	Lab Course (based on CS-532 T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Skill Enhancement Course (SEC-3)	CS-541 P	Any one skill to be chosen out of two **SEC-3(E):** Aptitude and Reasoning **SEC-3(F)**: Website Hosting using Word Press	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
Non Credit Course								
			39 Periods/week	**23**	**520**	**130**	**650**	**260**
Total Credit for Semester V : 23 (Theory : 14 : Laboratory : 9)								

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Choice Based Credit System (CBCS) Curriculum

For

Faculty of Science and Technology

Course Structure and Scheme of Examination

B. Sc. (Computer Science)Three Year Under Graduate Degree Program

Semester-VI

Course Type	Course Code	Course Title	Total Periods (Teaching Periods / Week)	Credits	Scheme of Examination			
					UA	IA	Max Marks	Min Marks
Discipline Specific Elective–IV (DSE – 1B)	CS-611T	**DSE-1B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Java Web Frameworks B1: ASP.NET C1: AWS (Amazon Web Services) D1: Neural Network	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-612T	**DSE-1B (2)** Select any one Paper from(A2/B2/C2/D2) A2: Compiler Design B2: Data Warehouse C2: Distributed Database Management System D2: Deep Learning	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-613P	Lab Course (based on CS-611T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-614P	Lab Course (based on CS-612T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Discipline Specific Elective–IV (DSE – 2B)	CS-621 T	**DSE-2B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Software Quality Assurance & Testing B1: GIS and Remote Sensing C1: Ethical Hacking D1: Cryptography & Network Security	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-622T	**DSE-2B (2)** Select any one Paper from(A2/B2/C2/D2) A2: Linux Administration	45 (3/per week)	**2**	**40**	**10**	**50**	**20**

		B2: Advance Data Science C2: Advanced Networking protocols D2: Fuzzy System						
	CS-623P	Lab Course (based on CS-621T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-624P	Lab Course (based on CS-622T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Discipline Specific Elective–IV (DSE – 3B)	CS-631T	**DSE-3B (1)** Select any one Paper from(A1/B1/C1/D1) A1: Machine Learning B1: Cyber Crime & Mitigation C1: Software Project Management – II D1: Big Data Analytics	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-632T	**DSE-3B(2)** **Major Project**	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
	CS-633P	Lab Course (based on 631T)	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
	CS-634P	**Seminar**	45 (3/per week)	**1.5**	**40**	**10**	**50**	**20**
Skill Enhancement Course (SEC-4)	CS-641P	Any one skill to be chosen out of two **SEC-4(G):**Personality Development **SEC-4(H):** Digital Marketing	45 (3/per week)	**2**	**40**	**10**	**50**	**20**
			39 Periods/ week	**23**	**520**	**130**	**650**	**260**
Total Credit for Semester VI : 23 (Theory : 14 : Laboratory : 9)								

B.Sc. (Computer Science)

Semester - V

Curriculum for semester V

DSE-1A(1)

Course code: CS-511 T **Course Title: A1: Advanced JAVA**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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
13) Advanced Java, M. T. Savaliya, dreamtech

Course Code: CS-513 P **Course Title : Practical based on A1 CS-511 T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course **A1 CS-511 T. (Advance 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

DSE-1A(1)

Course code: CS-511 T **Course Title : B1: VB.NET**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites Web Programming
Learning Objectives :-

- The .NET platform has evolved quickly to become a robust technology platform for enterprise application development and systems integration.
- The students of this course will be able to cultivate programming skills by imparting in-depth knowledge of .NET Programming techniques using VB.NET.
- The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

  To design user interface, code, test and debug related vb.net applications

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

- Describe the architecture of Dot Net Technology.
- Develop single form based .simple Net applications using basic and advanced control
- Develop multiple form and menu based .Net applications
- Develop small ADO.net based database related .Net application
- Implement and trouble shoot simple to complex level .Net Applications

Course Outline

Unit – 1: Introduction :- Concept IDE- Menu, Tool Bars, Property Window, Solution Explorer, Windows Form, Designer, Visual Basic Code Editor, Console Applications Development, Introduction to Writing First VB.NET Program Debugging

Unit – 2: Fundamentals Of VB.NET :- Data Types, Variables and Constants, Program Control Statements - Loop Structure(For/Next, While, Do while, Do Until), Test Structure (If Else, Nested If, Select Case), Subroutines, Functions and Events, Arrays, Enumerations, Structures.

Unit – 3: Windows Forms Common Controls :- Form, Label, Button, Textbox, Rich text box, Radio Button, Check Box,List Box, Combo Box, Scrollbar, Trackbar, TreeView, Listview, (Basic properties, methods and events of each control).

Unit -4 : Advance Form Controls :- Dialog Boxes(OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog) Menus, MDI Form, **Exception Handling** - Types Of Error,Error Detection,Exception Handling, Structured Error Handling(Try-Catch-Finally),Throwing Manual Exception.

Unit– 5: Test and Tutorial

Reference Books :
1) Beginning Visual Basic 2008, Thearon Willis,Bryan Newsome - Wrox Publication, New Delhi,2008
2) Visual Basic 2008 Programmer's Reference, Rod Stephens, Wrox Publication, New Delhi,2008
3) VB.Net in Nutshell , 2 nd Edition., Steven Roman, Paul Lomax, Oreilly

Course Code: CS-513 P **Course Title : Practical based on B1.CS-511 T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course B1 CS-511 T (VB.NET)

a) Implement Arithmetic calculator using console.

b) Develop a program to produce grade sheet using console.

c) Develop a program to check given number is prime or not using console.

d) Develop a program to print Fibonacci series using console.

e) Develop a program to check given number is palindrome or not using console.

f) Develop a program to factorial of a number using function using console.

g) Create form to demonstrate use of methods and properties of array.

a) Display message using Textbox, Label and ButtonControl.

b) Implement simple textpad to perform undo, redo, cut, copy, paste, select all, find, replace, loadfile, savefile operations using richtextbox.

c) Create employee registration form to collect details (using radio button, checkbox and other controls).

d) Create form to select hobbies and nationality using checkbox and radio button.

e) Create a form to demonstrate use of methods and properties of listbox.

f) Create a form to demonstrate use of methods and properties of combobox.

g) Implement canteen order form to take order from customer (using listbox and combobox)

h) Create a form to change the height and width of label using trackbar.

i) Implement colour palate to change the backcolor and forecolor of textbox using scrollbar.

j) Create form to demonstrate use of methods and properties of treeview.

k) Create MDI application having file menu (New, Open, Save, Print, Close) and Format menu (Font, Forecolor, Backcolor).

l) Create form to demonstrate use of structured exception handling.

DSE-1A(1)

Course code: CS-511 T **Course Title: C1.Cloud Computing Foundation**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

1. N/A

Learning Objectives :-

- To uncover the core concepts of cloud computing to the students
- at the same time providing sample foundations
- to enable further study, research and implementation of cloud computing services.

Learning Outcomes :

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

- Visualize the various cloud computing environments.
- Understand the core concepts of parallel, distributed computing and its architecture.
- Learn and implement virtualization environments.
- Articulate the insights of cloud computing architecture and its types.

Course Outline

Unit – 1: Introduction Cloud Computing at a glance, The vision of cloud computing, Defining a cloud, A closer look, The cloud computing, reference model, Characteristics and benefits, Challenges ahead, Historical Developments, Distributed systems, Virtualization, Web 2.0, Build Cloud Computing Environments, Computing platforms and technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop

Unit – 2: Principles of Parallel and Distributed Computing, Eras of computing Parallel vs. distributed computing,Elements of parallel computing, What is parallel processing? Hardware architectures for parallel processing, Approaches to parallel programming,Elements of distributed computing, General concepts and definitions, Components of a distributed system, Architectural styles for distributed computing, System architectural styles, Models for interprocesscommunication,Technologies for distributed computing, Service-oriented computing

Unit – 3: Virtualization – Introduction,Characteristics of virtualized, environments,Taxonomy of virtualization techniques, Execution, virtualization, Machine reference model, Other types of virtualization, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples, VMware: full virtualization, Virtualization Solution, End-user (desktop) virtualization

Unit -4 : Cloud Computing Architecture – Introduction, The cloud reference model, Architecture, Infrastructure- and hardware-as-a-service, Platform-as-a-service, Software-as-a-service, Types of clouds - Public clouds, Private clouds, Hybrid clouds, Community clouds, Economics of the cloud

Unit– 5: Test and Tutorial

Reference Books :

1) 1) Essentials of Cloud Computing By K. Chandrasekaran Publication: CRC press, 2015

List of Open Source Software/learning website:

Supplemental materials for instructors or students can be downloaded from else were:

1) http://store.elsevier.com/product.jsp?isbn=9780124114548
2) https://www.tutorialspoint.com/cloud_computing/index.htm
3) https://www.geeksforgeeks.org/cloud-computing/

Course Code: CS-513 P **Course Title: Practical based on C1.CS-511-T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course C1.CS-511-T (Cloud Computing Foundation)

1. Installation and configuration of own Cloud
2. Implementation of Virtualization in Cloud Computing to Learn Virtualization Basics, Benefits of Virtualization in Cloud using Open-Source Operating System.
3. Study and implementation of infrastructure as Service using Open Stack.
4. Write a program for Web feed using PHP and HTML.
5. Write a Program to Create, Manage and groups User accounts in own Cloud by Installing Administrative Features.
6. Design and develop custom Application using Cloud computing.
7. Assignment to install and configure Google App Engine.
8. Design an Assignment to retrieve, verify, and store user credentials using Firebase Authentication, the Google App Engine standard environment, andGoogle Cloud Data store.
9. Creating an Application in SalesForce.com using Apex programmingLanguage.
10. Design an Assignment based on Working with Mangrasoft AnekaSoftware

DSE-1A(1)

Course code: CS-511 T **Course Title: D1.C# Programming**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

1. Concepts of Object oriented programming approach

Learning Objectives:-

- Object oriented programming has gain momentum because of the object reuse. .NET provides object oriented development framework. .NET provides a base class library that supports innovative web development.
- It enables to fulfill varied functions like graphic rendering and file reading.
- It has all the resources to provide websites with different functionality and manage it smoothly at the same time. .NET provides Consistent programming model, Direct Support for Security, Simplified Development efforts and Easy application deployment and Maintenance.

Learning Outcomes

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

- Use .net framework architecture, various tools, and Validation techniques, use of different templates available in Visual Studio, Implementation and testing strategies in real time applications.
- Use advanced concepts related to Web Services, WCF, and WPF in project development

Course Outline

Unit – 1: Introduction to .NET Framework: NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell - Managed Execution

Unit – 2: C# - The Basics and Console Applications in C#: Name Spaces - Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers - Property and Indexers , Attributes & Reflection API, When to use Console Applications - Generating Console Output, Processing Console Input

Unit – 3: C#.NET: Language Features and Creating .NET Projects, Namespaces

Classes and Inheritance -, Namespaces Classes and Inheritance -, C, Exploring the Base Class Library -, Debugging and Error Handling -,Data Types -, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections, ADO.NET: Benefits of ADO.NET, ADO.NET compared to classic ADO -, Datasets, Managed Providers -, Data Binding: Introducing Data Source Controls -, Reading and Write Data Using the SqlDataSource

Control

Unit -4 : Windows Forms and Controls in details: The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus - Dialogs – ToolTips, Visual Inheritance in C#.NET: Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms.

Unit– 5: Test and Tutorial

Reference Books :

1. Christian Nagel, Professional C# .Net, Wrox Publication
2. Matthew Macdonald and Robert Standefer, ASP.NET Complete Reference,
3. Vijay Mukhi, C# The Basics, BPB Publications

Course Code: CS-513 P **Course Title : Practical based on D1. CS-511-T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course D1.CS-511-T (C# Programming)

1) Write a program to check whether empty query string is entered in C#

2) Write a program to change color of Label text control programmatically in C#

3) Write a program to Enable-Disable Textbox and change width of TextBox programmatically in C#

4) Write a program to increase and decrease font size programmatically.

5) Write C# code to display the asterisk pattern as shown below:

*****

*****

*****

*****

*****

6) Write C# code to prompt a user to input his/her name and country name and then the output will be shown as an example below:

Hello Chhatrapati Sambhajinagar, from country India!

7) Write C# code to do the following

-Convert binary to decimal

-Convert decimal to hexadecimal

-Convert decimal to binary

-Convert decimal to octal

8) Write C# code to convert infix notation to postfix notation.

9) Write a C# code to convert digits to words

10) Write a C# code to Convert following currency conversion.Rupees to dollar, frank, euro.

11) Write a C# code to Perform Celsius to Fahrenheit Conversion and Fahrenheit to Celsius conversion.

DSE-1A(2)

Course code: CS-512 T **Course Title: A2. Theory of Computation**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

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: CS-514 P **Course Title : Practical based on A2. CS-512-T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course A2.CS-512-T (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.

DSE-1A(2)

Course code: CS-512 T **Course Title: B2. Data Mining**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

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 – 2Data 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 Education

Course Code: CS-514 P **Course Title : Practical based on B2.CS-512 T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course B2.CS-512-T (Data Mining)

Laboratory work will be based on the above syllabus B2.CS-512-T (Data Mining) with minimum 10 experiments to be incorporated.

DSE-1A(2)

Course code: CS-512 T **Course Title: C2. Advanced PHP**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :-

Learning Objectives

This course enables students to do web programming using PHP and MySQL .It would enable them to develop websites and other web based applications

Learning Outcomes

After learning the course the students should be able to:

- Perform Server and Client-side validations in PHP.
- Design and develop dynamic web applications using PHP.

Course Outline

Unit- I : Form Interaction

Introduction to a web form, processing a web form, capturing form data, passing information between pages, PHP $_GET, PHP $_POST, with multi value fields, Superglobal variables , Working with Number, Strings functions, Working with Dates and Time

Unit – II : Validation

Interaction with HTML form, Validating HTML Form – name, email, number etc., input validation, exception and error handling, cookies and session handling.

Unit – III : Working with database

Introduction to MySQL: Features, Merits and Demerits - MySQL data types and constraints - Working withForms PHP and MySQL Integration – Basic SQL Commands (Insert, Update, Delete, Select) – MySQLfunctions (mysqli_connect, mysqli_select_db, mysqli_query, mysqli_num_rows, mysqli_fetch_array, mysqli_fetch_field, mysqli_close)

Unit – IV : Working with Files

Code re-use, require(), include(), and the include_path, PHP file permissions, working with files: opening, closing, reading, writing a file, file system functions and file input and output, working with directory: creating, deleting, changing a directory, file uploads

Unit – IV : Test & Tutorials

Reference Books:

1. VIKRAM VASWANI, “PHP and MySQL”, Tata McGraw-Hill
2. BEN FORTA , ”MySQL Crash course “ SAMS.
3. C.J. DATE, “An Introduction to Database Systems”, Addison Wesley, Sixth Edition.
4.Ramesh Elmasri and Shamkant B Navathe,” Fundamentals of DataBaseSystems”,PearsonEducation,Third Edition.
5. Tim Converse, Joyce Park and Clark Morgan, ”PHP 5 and MySQL”, Wiley India reprint.
6. Robert Sheldon, Geoff Moes, ”Beginning MySQL”, Wrox.
7. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas

Course Code: CS-514 P **Course Title : Practical based on C2.CS-512-T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course C2.CS-512-T (Advanced PHP)

1. Creation of files
2. File manipulation using PHP
3. Creation of sessions
4. Creation of cookies
5. Creating simple applications using PHP
6. Creating simple table with constraints
7. Insertion, Updation and Deletion of rows in MYSQL tables
8. Searching of data by different criteria
9. Sorting of data
10. Demonstration of joining tables
11. Usage of subqueries
12. Usage of aggregate functions
13. Working with set operators
14. Working with string, numeric and date functions
15. Database connectivity in PHP with MySQL
16. Validating Input

DSE-1A(2)

Course code: CS-512 T **Course Title: D2.BlockChain**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Networking security, Database management system etc

Learning Objectives

- To make the students aware about creation of strong cryptographic distributed and replicated ledger of events, transactions, and data generated through various IT processes.
- To make the students familiar with crypto currencies.

Learning Outcomes

After learning the course the students should be able to:

- familiarise the functional/operational aspects of cryptocurrency.
- understand emerging abstract models for Blockchain Technology.
- identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain.

Course Outline

Unit–1 Introduction - Basic ideas behind blockchain, How it is changing the landscape of digitalization, Cryptographic basics for cryptocurrency, A short overview of hashing, Signature schemes, Encryption schemes and elliptic curve cryptography

Unit - 2 Models for Blockchain - The Consensus problem, Asynchronous Byzantine Agreement, AAP protocol and its analysis, Nakamoto Consensus on permission-less, nameless, peer- to-peer network, Abstract Models for Blockchain, GARAY model, RLA Model, Proof of Work (PoW) as random oracle, formal treatment of consistency, liveness and fairness, Proof of Stake (PoS) based Chains, Hybrid models (PoW + PoS)

Unit - 3 Mechanics of Bitcoin Bitcoin, Wallet, Blocks, Merkley Tree, Bitcoin transactions, Transaction verifiability, Anonymity, Forks, Double spending, Mathematical analysis of properties of Bitcoin, Bitcoin scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bitcoin network, Limitations and improvements, How to store and use Bitcoins, Simple local storage, Hot and cold storage, Splitting and sharing keys, Online wallets and exchanges, Payment services, Transaction fees, Currency exchange markets

Unit - 4 Alternative coin and Recent Trends Ethereum, Ethereum Virtual Machine (EVM), Wallets for Ethereum, Solidity, Smart Contracts, some attacks on smart contracts, Zero Knowledge proofs and protocols in Blockchain, Succinct non interactive argument forKnowledge (SNARK), pairing on Elliptic curves, Zcash

Unit - 5 Test and Tutorial/Case Studies

Uses of Blockchain in E-Governance, Land Registration, Medical Information Systems and others.

Reference Books:-

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction
by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder Princeton University Press, 2016
2. SoK: Research Perspectives and Challenges for Bitcoin and Cryptocurrency
by Joseph Bonneau et al IEEE Symposium on Security and Privacy, 2015
3. The bitcoin backbone protocol - analysis and applications by J.A.Garay et al
EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310

Course Code: CS-514 P **Course Title : Practical based on D2 CS-512 T**

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course D2 CS-512-T(**BlockChain**)

1. Create different types of Blockchain bitcoin wallet.
2. Do the Bitcoin Transaction from bitcoin wallet.
3. Implement Merkley tree hash algorithm.
4. Set up an environment for Ethereum on Windows and Linux.
5. Install & setup Ethereum wallet and send/receive ether.
6. Create smart contracts using solidity.
7. Create smart contract for connect with the front end (web page).
8. Implement smart contract to send ether to another contract/address.
9. Implement smart contract for deposit and withdrawals money from digital bank.
10. Implement zero knowledge proof protocol using blockchain.

DSE-2A(1)

Course code: CS-521 T **Course Title: A1. Software Engineering**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

1. Object Oriented Programming fundamental
2. UML

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.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.
- To expose Software Process Improvement and Reengineering.

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.
- Apply various testing techniques and test plan in.
- Able to understand modern Agile Development

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
8. Robert C. "Uncle Bob" Martin , Clean Architecture: A Craftsman's Guide to Software Structure and Design

Course Code: CS-523 P **Course Title :** Practical based on A1.CS-521-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course A1.**CS-521-T**. (**Software Engineering)**

Laboratory work will be based on the above syllabus A1.CS-521-T. (Software Engineering) with minimum 10 experiments to be incorporated.

DSE-2A(1)

Course code: CS-521 T **Course Title: B1. Modelling& Simulations**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

1. Basic techniques of algorithm analysis and problem solving
2. Familiar with basic data structures, e.g. queues and stacks
3. Familiar with encapsulation using functions

Learning Objectives

- Introduction to discrete-event systems, a survey of modelling tools, mathematical & statistical modelling,
- role of random numbers, verification & validation, and applications.

Learning Outcomes

After learning the course the students should be able to:

- Be familiar with the history, advantages, and disadvantages of simulations.
- Be familiar with a variety of simulation environments and tools.
- Be familiar with concepts in discrete-event simulation models.
- Be familiar with statistical models and discrete distributions.
- Be exposed to random numbers and their generation.
- Be exposed to input modeling and parameter estimation.
- Be familiar with verification, validation, and documentation of simulation models.
- Development of simulation models to address topics in the above outcomes.

Course Outline

Unit – 1 Introduction to Simulations, Brief History, Advantages & disadvantages, Components of Systems and Simulations, Steps in a simulation design, Simulation Environments and Tools, Spreadsheets, Software, Environments

Unit - 2 Concepts in Discrete-Event Simulation, Event scheduling, Event processing, Statistical Models and Discrete Distributions, Terminology, Queueing and supply-chain systems, Reliability, Discrete distributions

Unit - 3 Random-Number Generation, Properties of Random numbers, Generation of pseudo-random numbers, Techniques for generation, random numbers, Input modelling and Parameter Estimation, Data collection, Identifying distributions, Parameter estimation, Goodness-of-fit tests, Selecting input models

Unit - 4 Verification and Validation, Model building and V&V, Verification, Validation, Documentation.

Unit - 5 Test and Tutorial

Reference Books:-

1. Banks, Carson, Nelson & Nicol – Discrete-Event System Simulation, 5 th Edition, Pearson, 2010, 978-0136062127

Course Code: CS-523 P **Course Title :** Practical based on B1.CS-521-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1.**CS-521-T**. (**Modeling & Simulations)**

Laboratory work will be based on the above syllabus B1.CS-521-T. (Modeling & Simulations) with minimum 10 experiments to be incorporated.

DSE-2A(1)

Course code: CS-521 T Course Title: C1. INFORMATION & SYSTEM SECURITY

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

1. Fundamental of Computers, Operating System, Networking etc

Learning Objectives

- Learn about the threats in computer security.
- Understand what puts you at a risk and how to control it. Controlling a risk is not eliminating the risk but to bring it to a tolerable level.

Learning Outcomes

After learning the course the students should be able to:

- To prevent theft of or damage to the hardware/system/OS
- To prevent theft of or damage to the information
- To prevent disruption of service

Course Outline

Unit – 1 Introduction: Notion of different types of securities : Information Security. Computer Security: Security Goals, Relation between Security-Confidentiality, Integrity, Availability and Authorization, Vulnerabilities- Principles of Adequate protection. Operating security, Database security, Program security, Network Security (Notions Only). Attacks: Threats, Vulnerabilities and controls. The kind of problems-Interception, Interruption, Modification, Fabrication. Computer Criminals: Amateurs, Crackers, Career Criminals. Methods of Defense: Control, Hardware Controls, Software Controls, Effectiveness of Controls.

Unit – 2 Program Security: Secure programs: Fixing Faults, Unexpected Behaviour, Types of Flaws. Non-malicious program errors: Buffer overflows, Incomplete Mediation. Viruses and other malicious code: Why worry about Malicious Code, Kinds of malicious code, How viruses attach, How viruses gain control, Prevention, Control Example: The Brain virus, The Internet Worm, Web bugs. Targeted malicious code- Trapdoors, Salami Attack. Controls against program threats- Development Controls, Peer reviews, Hazard Analysis.

Unit – 3 Operating System Security: Protected objects and methods of protection, Memory address protection- Fence, Relocation, Base/Bounds Registers, Tagged Architecture, Segmentation, Paging. Control of access to generall objects- Directory, Access Control List. File protection mechanism- Basics forms of Protection, Single Permissions. Authentication: Authentication basics,Password, Authentication Process Challenge-response, Biometrics. Trusted Operating systems- Security Policies for Operating Systems, Models of Security- Requirement of security systems, Multilevel Security, Access Security, Limitations of Security Systems. Trusted Operating System Design- Elements, security features, assurance, system flaws and assurance methods.

Unit – 4 Administrating Security: Security planning- Contents of a security Planning Team members, commitment to a security plan, Business continuity Plans. Risk analysis- The nature of risk, steps of risk analysis. Arguments for and against risk analysis, Organizational security policies- Purpose and goals of Organizational Security. Audience, Characteristics of a Good Security Policy.

Nature of security Policies- Data sensitivity policy, Government Agency IT security policy. Physical security- Natural Disaster, Human Vandals, Interception of Sensitive Information.

Unit - 5 Test and Tutorial

Reference Books:-

1. C. P. Pfleeger, and S. L. Pfleeger, “Security in Computing”, Pearson Education.
2. Matt Bishop, “Computer Security: Art and Science”, Pearson Education.
3. Stallings, “Cryptography And Network Security: Principles and practice”
4. Whitman, Mattord, “Principles of information security”, Thomson

Course Code: CS-523 P **Course Title :** Practical based on C1.CS-521-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course **C1. INFORMATION & SYSTEM SECURITY**

Laboratory work will be based on the above syllabus **C1. INFORMATION & SYSTEM SECURITY** with minimum 10 experiments to be incorporated.

DSE-2A(1)

Course code: CS-521 T **Course Title: D1. Natural Language Processing**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites : NA

Learning Objectives

- NLP is about getting computers to perform useful and interesting tasks involving spoken and written human language.
- NLP is sometimes referred to as Computational Linguistics to emphasize the fact that this subject involves the combination of CS methods with research insights from Linguistics.

Learning Outcomes

After learning the course the students should be able to:

- Develop an understanding of the general problems that people who work on NLP study and the strategies they use to solve them.
- Understand the role of data, machine learning, and neural networks in NLP systems.
- Understand the ethical considerations and potentials for bias in NLP systems.
- Be able to implement models to solve some "standard" NLP problems.
- Be able to formulate potential starting points given a new problem with NLP elements.
- Understand some of the motivating linguistic phenomena that make NLP problems hard and why these can be hard phenomena for computers to approach.

Course Outline :

Unit – 1 **Introduction:** History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing, Ambiguity in Natural language, stages in NLP, challenges of NLP, Applications of NLP

Unit – 2 Word Level Analysis: Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST) ,Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams- N-gram, language model,

Unit – 3 Syntax analysis Part-Of-Speech tagging(POS)- Tag set for English (Penn Treebank) , Rule based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labeling: Hidden Markov Model (HMM),Maximum Entropy

Unit – 4 Text Summarization, Text Classification Text summarization- LEXRANK , Optimization based, approaches for summarization , Summarization evaluation, Text classification

Unit - 5 Test and Tutorial

Reference Books:-

1. Jurafsky, D. and J. H. Martin, Speech and language processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition (2nd Edition). Prentice-Hall, 2008.
2. Charniak, E.: Statistical Language Learning. The MIT Press. 1996.
3. J. Allen: Natural Language Understanding. Benjamin/Cummins.1995.
4. https://archive.nptel.ac.in/courses/106/101/106101007/

Course Code: CS-523 P **Course Title :** Practical based on D1.CS-521-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D1.**CS-521-T**. (**Natural Language Processing)**

Laboratory work will be based on the above syllabus D1.CS-521-T. (**Natural Language Processing**) with minimum 10 experiments to be incorporated.

DSE-2A(2)

Course code: CS-522 T **Course Title: A1. Shell Programming**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites: Basic knowledge of Operating System concepts along with UNIX/LINUX Operating System is essential. Fundamentals of Programming language is helpful.

Learning Objectives

- To learn the shell programming under linuxo.s.
- To know the advanced features of Linux OS for programming.
- To learn basic set of commands in Shell Programming
- Understand Shell Scripting and Shell Programming.

Learning Outcomes

After learning the course the students should be able to:

- Execute Linux commands
- Install packages and manage user accounts in Linux
- Implement basic scripts in shell programming.

Course Outline :

Unit – 1 Overview of LINUX : Installation of Linux O.S., Process Features, Internal & External Commands, Basic Commands, Command Structure, Shell Script & Shell Programming, LINUX Server.

Unit – 2 Redirection & Pipes: Standard I/O Streams, Redirection & Pipes, Command Execution, Command-Line Editing, Quotes. Filters: Filters, Concatenating, Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Ordering a File. Regular Expressions: Atoms,operators, grep, sed, awk etc.

Unit – 3 Shell Scripting: Introduction to Shell, Types of Shell, C shell features, Structure of Shell program, writing first script writing script, Executing & Debugging script. Shell Programming: various Shell variables, outpout - echo command, quote charaters, Input – read command, set, expr command, various operators, exit Status of a Command,

Unit – 4 Statememts : Branching Control Structures, Loop-Control Structure, and loop intruption - Continue and break Statements, Expressions, Command Substitution, Command Line Arguments and Functions**.**

Unit - 5 Test and Tutorial

Reference Books:-

1. Yashavant P. Kanetkar “Unix Shell Programming”, BPB Publications.
2. Venkatesh Murthy, “Introduction to Unix &Shell”, Pearson Edu.
3. Forouzan, “Unix & Shell Programming”, Cengage Learning.
4. SumitabDas,”Unix Concept & Application”, TMH.
5. Venkateshwavle,”Linux Programming Tools Unveil`ed”, BS Publication.
6. Richard Peterson,”Unix Complete Reference”,TMH.

Course Code: CS-524 P **Course Title :** Practical based on A1.CS-522-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course A1.**CS-522-T**. (**Shell Programming)**

Laboratory work will be based on the above syllabus A1.CS-522-T. (**Shell Programming**) with minimum 10 experiments to be incorporated.

1. Execution of various file/directory handling commands.
2. Simple shell script for basic arithmetic and logical calculations.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. Shell scripts to explore system variables such as PATH, HOME etc.
6. Shell scripts to check and list attributes of processes.
7. Execution of various system administrative commands.
8. Use seed instruction to process /etc/password file.
9. Write a shell script to display list of users currently logged in.
10. Write a shell script to delete all the temporary files.
11. Write a shell script to search an element from an array using binary searching.
12. Write script to print the message “Hello” on the Console.
13. Write script to perform following basic math operation as :

i) Take input from keyboard

ii) Take input as command line parameter

14. Write script to display current date, time, username and current directory.
15. Write shell script to show various system configurations like:

a) Currently logged user and his long name

b) Current shell

c) Your home directory

d) Your operating system type

DSE-2A(2)

Course code: CS-522 T **Course Title: B1. Basic Data Science**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites : None

Learning Objectives

- Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight.
- To introduce students to the collection, Preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues.
- Examples and case studies from diverse fields will be presented, and hands-on use of statistical and data manipulation software will be included

Learning Outcomes

After learning the course the students should be able to:

- Recognize various disciplines that contribute to a successful data science effort.
- Understand the processes of data science - identifying the problem to be solved,
- data collection, preparation, modelling, evaluation and visualization.
- Be aware of the challenges that arise in data sciences.
- Develop and appreciate various techniques for data modelling and mining.

Course Outline :

Unit – 1Introduction to Business Analytics Why Analytics? Business Analytics: The Science of Data-Driven Decision Making, Descriptive Analytics, Predictive Analytics, Prescriptive Analytics, Descriptive, Predictive and Prescriptive, Analytics Techniques.

Unit – 2 Big Data Analytics, Web and Social Media Analytics, Machine Learning Algorithms, Framework for Data-Driven Decision Making, Analytics Capability Building, Roadmap for Analytics Capability Building, Challenges in Data-Driven Decision Making and Future.

Unit – 3 Descriptive Analytics, Introduction to Descriptive Analytics, Data Types and Scales, Types of Data Measurement Scales.

Unit – 4 Population and Sample, Percentile, Decile and Quartile, Measures of Variation, Measures of Shape − Skewness and Kurtosis

Unit - 5 Test and Tutorial

Reference Books:-

1. Dinesh Kumar, Business Analytics, Wiley IndiaBusinenalytics: The Science
2. V.K. Jain, Data Science & Analytics, Khanna Book Publishing, New Delhi of Dat
3. Data Science For Dummies by Lillian Pierson , Jake Porway

Course Code: CS-524 P **Course Title :** Practical based on B1.CS-522-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1.**CS-522-T**. (**Basic Data Science)**

Laboratory work will be based on the above syllabus B1.CS-522-T. (**Basic Data Science**) with minimum 10 experiments to be incorporated.

DSE-2A(2)

Course code: CS-522 T **Course Title: C1. Basic Networking Protocols**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites : None

Learning Objectives

- The major components of computer based information systems is computer networks. Through computer networks we can share hardware, Software, Processing, Data and Applications besides getting global connectivity for internet based communication and services.
- to make students learn the technology of establishing, commissioning (making operational) and maintaining computer networks.

Learning Outcomes
After learning the course the students should be able to :

- Identify the computer network topologies and its features.
- Understand routing algorithms and routing techniques.

Course Outline :

Unit – 1 Optical Networking : Introduction to Optical Networking, SONET / SDH Standard, DWDM

Unit – 2 ATM: The WAN Protocol : Introducing ATM Technology, Introducing Faces of ATM, Explaining the basic concepts of ATM Networking, Exploring the B-ISDN reference model, Explaining the Physical Layer, Explaining the ATM Layer, Explaining the ATM Adaptation Layer, Exploring ATM Physical interface, Choosing an Appropriate ATM Public Service

Unit – 3 Packet Switching Protocols : Introduction to Packet Switching, Introduction to Virtual Circuit Packet Switching, Introduction to X.25, Introducing switched multimegabit data service

Unit – 4 Protocols and Interfaces in Upper Layers of TCP/IP : Introducing TCP/IP suite, Explaining Network Layer Protocols, Explaining Transport Layer Protocol, Explaining Application Layer Protocol.

Unit - 5 Test and Tutorial

Reference Books:-

1. Advance Computer Network, By Dayan and Ambawade, Dr. Deven shah,Prof. Mahendra Mehra,Wiley India
2. High-Speed Networks and Internets, Performance and Quality of Service,Second Edition, William Stallings, Pearson
3. TCP/IP Protocol Suite by Behrouz A. Forouzan
4. Computer Networks, Andrew Tanenbaum, 5th Edition, Pearson Education.

Course Code: CS-524 P **Course Title :** Practical based on C1.CS-522-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course C1.**CS-522-T**. (**Basic Networking Protocols)**

1. Introduction to SONET / SDH networks.
2. To study about IPV4 addresses.
3. Installation of Linux (MANDRIVA / OPEN SUSE 10 GNOME Tool).
4. Introduction and installation of Network Simulator (NS-2.30)

Design based Problems (DP)/Open Ended Problem:
1. Router installation and study of specifications and Router configuration of campus/institute
2. Prepare the presentation and report on different network.
3. Learning of Linux commands for network.

Major Equipment:
1. Linux based computer system
2. Network simulator software

DSE-2A(2)

Course code: CS-522 T **Course Title: D1. Programming in SCILAB**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites

- Basic Programming knowledge,
- Knowledge of Numerical Methods, Mathematics,
- Linux Operating System Desktop environment.

Learning Objectives

- To explore the various basic feature of SCILAB for a user who has never used numerical computation software.
- Computations, graphs and illustrations are made withSCILAB

Learning Outcomes

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

- Describe basic commands of SCILAB.
- Explain various methods to find roots of Algebraic and Transcendental equations using SCILAB.
- Illustrate the concepts of recurrence relations.
- Analyze different concepts of discrete mathematics and graph theory.
- Determine parity check and generator matrix.
- Build the necessary skill set and analytical abilities for writing computer-based solutions using mathematical concepts.

Course Outline

Unit -1 Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy. Programming Environment: SCILAB Environment, Workspace, Working Directory, Expressions, Constants, Variables and assignment statement, Arrays.

Unit -2 Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. Matrices and Some Simple Matrix Operations, Sub- Matrices. Procedures and Functions: Arguments and return values,

Unit -3 Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.

Unit -4 Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list.

Unit -4 Test and Tutorial

Reference Books

1. M.Affouf, SCILAB by Example , CreateSpace Independent Publishing Platform, 2012
2. H. Ramchandran, A.S. Nair, SCILAB , S.Chand, 2011

Course Code: CS-524 P **Course Title :** Practical based on D1.CS-522-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D1.**CS-522-T**.

(**Programming in SCILAB)**

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
a. (3+4)/(5+6)
b. take any expression
c. take any expression
d. (0.0000123 + 5.67×10 -3) × 0.4567×10 -4

2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.

3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
a. 2, 4, 6, 8, 10
b. 1/2, 1, 3/2, 2, 5/2
c. 1, 1/2, 1/3, 1/4, 1/5
d. 1, 1/4, 1/9, 1/16, 1/25

4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill.

5. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.

6. The “identity” matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.

7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,...,√Nth entries, i.e. those numbers which have indices that are square numbers.

8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).

9. Calculate 10 approximate points from the function y=2x by using the formulae:
i. x n = n
ii. y n = 2n + rand - 0.5
Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.

10. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.

11. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.

12. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.

13. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
i. FtoC(96)
ii. lookfor Fahrenheit
iii. help FtoC

14. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
i.Enter string 1: Mark
ii.Enter string 2: Huckvale
iii. Mark Huckvale
iv.**********
v.elavkcuHkraM

DSE-3A(1)

Course code: CS-531 T **Course Title: A1. Artificial Intelligence**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)
Prerequisites

- Data Structures, Mathematics

Course Objectives

- With the usage of Internet and World Wide Web increasing day by day, the field of AI and its techniques are being used in many areas which directly affect human life.
- Various techniques for encoding knowledge in computer systems such as Predicate Logic, Production rules, Semantic networks find application in real world problems.
- The fields of AI such as Game Playing, Natural Language Processing, and Connectionist Models are also important. Student should know some programming language for AI.

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

- Understand the search technique procedures applied to real world problems
- Understand and use various types of logic and knowledge representation schemes.
- Understand various Game Playing techniques and apply them in programs.
- Gain knowledge in AI Applications and advances in Artificial Intelligence

Course Outline
Unit 1 - Introduction :The AI Problems, The Underlying Assumption, AI techniques, The Level of The Model, Criteria For Success

Unit 2 - Problems, State Space Search & Heuristic Search Techniques: As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Unit 3 - Knowledge Representation: Representations And Mappings, Approaches To Knowledge Representation, Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions and Predicates, Resolution, Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning.

Unit 4 - Symbolic Reasoning Under Uncertainty: Introduction To Nonmonotonic Reasoning, Logics For Non-monotonic Reasoning. Expert System , Introduction to Prolog: Introduction, Converting English to Prolog Facts and Rules,

Unit - 5 Test and Tutorial

Reference Books
1. “Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. “Artificial Intelligence: A Modern Approach” -By Stuart Russel, Peter Norvig, PHI
3. “Introduction to Prolog Programming” -By Carl Townsend.
4. “PROLOG Programming For Artificial Intelligence” -By Ivan Bratko(Addison-Wesley)
5. “Programming with PROLOG” –By Klocksin and Mellish.

Course Code: CS-533 P **Course Title :** Practical based on A1.CS-531-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course A1.**CS-531-T**.

(**Artificial Intelligence)**

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insertnth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n‘th element into every list at all levels.
6. Write a Prolog program to remove the Nth item from a list.
7. Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n‘th item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome(List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
11. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
12. Assume given a set of facts of the form father(name1,name2) (name1 is the father of name2).

DSE-3A(1)

Course code: CS-531 T **Course Title: B1. E-Commerce**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- Java, Database Management Systems, Advanced Java & Web Technologies

Learning Objectives

- Mechanism of business transactions through electronic media.
- Payment transactions in a secured network.
- Different modes of E-Commerce like Electronic data interchange.
- Web site establishment, electronic publishing and its importance.

Learning Outcomes

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

- Understand the framework and anatomy of ecommerce applications and analyze
- ecommerce consumer, organizational applications
- Infer mercantile process models from both merchant‟s and consumer‟s view point
- Understand the implementation of Electronic Data Interchange (EDI) in day to day life
- Study all the aspects of Intra-Organizational electronic commerce including supply chain management
- Analyze different consumer, information searching methods and resource discovery and information retrieval techniques.

Course Outline

Unit -1 Electronic Commerce Environment and Opportunities: The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward.

Unit -2 **Approaches to Safe Electronic Commerce:** Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

Unit -3 Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash. Internet/Intranet Security Issues and Solutions : The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption.

Unit – 4 Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: The Means of Distribution, A model for Message Handling, Email working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

Unit -5 Test and Tutorial

Reference Books

1. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook. TATA McGraw-Hill Edition.
2. Ravi Kalakotar and Andrew B.Whinston, Frontiers of Electronic Commerce. Pearson Education - 1999.
3 AchuyutS.Godbole and Atul Kahate, Web Technologies TCP/IP to Internet Application Architectures. Tata McGraw-Hill Publishing Company Limited.
4. Schneider, Electronic Commerce, Cengage Publications.

Course Code: CS-533 P **Course Title :** Practical based on B1.CS-531-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1.CS-531-T. (E-Commerce).

Laboratory work will be based on the above syllabus **B1.CS-531-T. (E-Commerce).** with minimum 10 experiments to be incorporated.

DSE-3A(1)

Course code: CS-531 T **Course Title: C1. Software Project Management - I**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- None

Learning Objectives

- Project Management is the discipline of defining and achieving targets while optimizing the use of resources (time, money, people, materials, energy, space, etc) over the course of a project (a set of activities of finite duration).
- It will also involve definite specifications and workings of an organization through proper planning.
- Project management in generally complex as it has multi- disciplinary areas included in various phases of its life span.
- A project is a series of task that is carefully planned to achieve a particular outcome.

Learning Outcomes

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

- Define software Project Management and its importance.
- Describes the characteristics of software projects.
- Describes projects and its attributes.
- Compares software Project with other projects.
- Differences between project management and contract management.
- Outlines the roles and responsibilities of Project managers.
- Explains in detail Project Management life.
- Categories software Project.
- Explains in details Project Charter.

Course Outline

Unit -1 Introduction to Software Project Management: Introduction, Why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, What is Management? Management Control, Project Management Life Cycle, Traditional versus Modern Project Management Practices.

Unit -2 **Project Evaluation and Programme Management:** Introduction, Business Case, Project Portfolio Management, Evaluation of Individual Projects, Cost–benefit Evaluation Techniques Risk Evaluation, Programme Management, Managing the Allocation of Resources within Programmes, Strategic Programme Management, Creating a Programme, Aids to Programme Management, Some Reservations about Programme Management, Benefits Management.

Unit -3 An Overview of Project Planning: Introduction to Step Wise Project Planning, Step 0: Select Project, Step 1: Identify Project Scope and Objectives, Step 2: Identify Project Infrastructure, Step 3: Analyse Project Characteristics, Step 4: Identify Project Products and Activities, Step 5: Estimate Effort for Each Activity, Step 6: Identify Activity Risks, Step 7: Allocate Resources, Step 8: Review/Publicize Plan, Steps 9 and 10: Execute Plan/Lower Levels of Planning

Unit -4Selection of an Appropriate Project Approach:Introduction, Build or Buy? Choosing Methodologies and Technologies, Software Processes and Process Models, Choice of Process Models, Structure versus Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping, Other Ways of Categorizing Prototypes, Incremental Delivery, Atern/Dynamic Systems Development Method, Rapid Application Development, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selecting the Most Appropriate Process Model. Software Effort Estimation:Introduction, Where are the Estimates Done? Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques, Bottom- up Estimating, The Top-down Approach and Parametric Models, Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating Rules of Thumb.

Unit -5 Test and Tutorial

Reference Books

1. Software Project Management. Bob Hughes, Mike Cotterell, Rajib Mall TMH 6 th
2. Project Management and Tools & Technologies – An overview Shailesh Mehta SPD
3. Walker Royce, “Software Project Management – A Unified Framework”, 2001, Pearson Education.
4. Roger S. Pressman, “Software Engineering”, 2001, McGraw Hill.
5. S.A.Kelkar, “Software Project Management – A concise study”, 2 nd Ed. PHI learning Pvt. Ltd. 2009
6. Project Management, Planning and Control by Pritam Lanjewar, Dr. UmeshKumar Malpani, Scientific International Publishing House.

Course Code: CS-533 P **Course Title :** Practical based on C1.CS-531-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course C1.CS-531-T. (Software Project Management - I).

Laboratory work will be based on the above syllabus **C1.CS-531-T. (Software Project Management - I)** with minimum 10 experiments to be incorporated.

DSE-3A(1)

Course code: CS-531 T **Course Title: D1. Introduction to Big Data**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- None

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,

Unit -4 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: CS-533 P **Course Title :** Practical based on D1.CS-531-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each).

Sample List of Experiments and Tutorials to be carried out based on the course D1.CS-531-T. (Introduction to Big Data).

Laboratory work will be based on the above syllabus **D1.CS-531-T. (Introduction to Big Data)** with minimum 10 experiments to be incorporated.

DSE-3A(2)

Course code: CS-532 T **Course Title: A1. Android Programming**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- Knowledge Programming Languages.

Learning Objectives

- provide basic ideas about how tocreate mobile application using android operating System

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

- To obtain knowledge of android and its features like history, designing, Sql lite etc
- To understand these concepts students should be aware from basic Java environment and its concepts with connectivity.
- It is one type of advance Operating System by learning this OS Students would be able to create smart phones application by themselves with database connectivity.

Course Outline
Unit -1 Introduction to Android, History of Mobile Software Development ,The Open Handset Alliance, The Android Platform Android SDK, Building a sample Android application, Anatomy of Android applications, Android terminologies, Application Context, Activities, Services, Intents Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, Working with different types of resources.
Unit -2 **Android User Interface Design Essential**s, User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Unit -3 Using Android APIs – 1 Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data between Applications with Content Providers

Unit -4 Using Android APIs – 2, Using Android Networking APIs,Using Android Web APIs Using Android Telephony APIs, Deploying (selling) your Android application.

Unit -5 Test and Tutorial

Reference Books

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, 2nd edition, Pearson Education
2. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
3. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
4. Sayed Y Hashimi and Satya Komatineni, “Pro Android”, Wiley India Pvt Ltd

Course Code: CS-534 P **Course Title :** Practical based on A1.CS-532-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course A1.CS-532-T. (Android Programming)

1. Create “Hello World” application. That will display “Hello World” in the middle of the screen in the red color with white background. To understand Activity, Intent

a. Create sample application with login module. (Check username and password)

b. On successful login, go to next screen. And on failing login, alert user using Toast.

c. Also pass username to next screen.

2. Create login application where you will have to validate Email ID (Username). Till the username and password is not validated, login button should remain disabled

3. Create and Login application as above. On successful login, open browser with any URL

4. Create an application that will pass some number to the next screen, and on the next screen that number of items should be display in the list.

5. Create spinner with strings taken from resource folder (res >> value folder)

6. Create an application that will change color of the screen, based on selected options from the menu.

7. Understanding of UI:

a. Create an UI such that, one screen has list of all the types of cars.

8. Create application which have usage of animation

9. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.

10. Understanding content providers and permissions: a. Read phonebook contacts using content providers and display in list.

DSE-3A(2)

Course code: CS-532 T **Course Title: B1. IoT (Internet of Things)**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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: CS-534 P **Course Title :** Practical based on B1.CS-532-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1.CS-532-T. (IoT (Internet of Things))

1. Define and Explain Eclipse IoT Project.
2. List and summarize few Eclipse IoT Projects.
3. Sketch the architecture of IoT Toolkit and explain each entity in brief.
4. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.5.
5. Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.
6. Describe gateway-as-a-service deployment in IoT toolkit.
7. Explain application framework and embedded software agents for IoT toolkit.
8. Explain working of Raspberry Pi.
9. Connect Raspberry Pi with your existing system components.
10. Give overview of Zetta.

DSE-3A(2)

Course code: CS-532 T **Course Title: C1. POWER BI**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- None

Learning Objectives

- To learn about Data Analysis Expressions (DAX) and Data Visualization with Power BI Desktop.
- To discover, explore and visualize enterprise data using Natural Language.

Learning Outcomes

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

- It provides interactive visualizations with self-service business intelligence capabilities.
- end users can create reports and dashboards by themselves, without having to depend on any information technology staff or database administrator.
- It offers Data modelling capabilities including data preparation, data discovery, and interactive dashboards.

Course Outline

Unit -1 Introduction to Power BI, Get Started with Power BI, Overview: Power BI concepts, Sign up for Power BI, Overview: Power BI data sources, Connect to a SaaS solution, Upload a local CSV file, Connect to Excel data that can be refreshed, Connect to a sample, Create a Report with Visualizations, Explore the Power BI portal, Overview: Visualizations , Using visualizations Create a new repor, Create and arrange visualizations, Format a visualization, Create chart visualizations, Use text, map, and gauge visualizations and save a report.

Unit -2 **Reports and Dashboards -** Modify and Print a Report, Rename and delete report pages , Add a filter to a page or report, Set visualization interactions, Print a report page, Send a report to PowerPoint, Create a Dashboard, Create and manage dashboards, Publishing Workbooks and Workspace, Share Data with Colleagues and Others, Publish a report to the web, Manage published reports, Share a dashboard, Create an app workspace and add users, Use an app workspace, Publish an app

Unit -3 Other Power BI Components and Table Relationship, Use Power BI Mobile Apps, Get Power BI for mobile. View reports and dashboards in the iPad app, Use workspaces in the mobile app, Sharing from Power BI Mobile, Use Power BI Desktop, Install and launch Power BI Desktop, Get data, Reduce data, Transform data

Unit -4DAX functions New Dax functions, Date and time functions, Time intelligence functions, Filter functions, Information functions, Logical functions, Math & trig functions, Parent and child functions, Text functions

Unit -5 Test and Tutorial

Reference Books

1. Introducing Microsoft Power BI by Alberto Ferrari and Marco Russo PUBLISHED BY Microsoft Press A division of Microsoft Corporation One Microsoft Way Redmond, Washington 98052-6399

Course Code: CS-534 P **Course Title :** Practical based on C1.CS-532-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course C1.CS-532-T. (POWER BI).

Laboratory work will be based on the above syllabus **C1.CS-532-T. (POWER BI)** with minimum 10 experiments to be incorporated.

DSE-3A(2)

Course code: CS-532 T **Course Title: D1. Video processing**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

- Mathematics, Fundamental knowledge of signals and systems.

Learning Objectives

- The growth is driven by several factors: widely available and relatively inexpensive hardware, variety of software tools for image and video processing, popularization of Web and its strong emphasis on visual information, a true revolution in photography, advances in movie industry and TV programs.

- Its becoming face of television, Internet and mobile devices. Starting with basics of video sampling and motion estimation, the subject covers essential topics including video segmentation, enhancement, video compression standards and video quality assessment.

Learning Outcomes

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

- Video enhancement and restoration
- Motion Detection
- Segment the video for scene change and motion detection
- Tracking the object position and/or orientation in video
- Video compression.
- Video quality assessment methods Student can also implement the above algorithms on hardware.

Course Outline

Unit -1 Introduction to Digital Video Processing Sampled Video Video Transmission Video Sampling & Interpolation.

Unit -2 Motion Detection and Estimation Notation and Preliminaries Binary Hypothesis Testing, Markov Random Fields, MAP Estimation, Variational Formulation Motion Detection, Hypothesis Testing with Fixed, and Adaptive Threshold, MAP MRF Formulation, MAP Variation Formulation ,Experimental Comparison of Motion Detection Methods. Motion Estimation Motion Models Estimation Criteria Search Strategies Practical Motion Estimation Algorithms Global Motion Estimation Block Matching Phase Correlation Optical Flow via Regularization MAP Estimation of Dense Motion

Unit -3 Video Enhancement and Restoration, Spatiotemporal Noise Filtering, Coding Artifact Reduction, Blotch Detection and Removal, Vinegar Syndrome Removal ,Intensity Flicker Correction , Kinescope Moire Removal ,Scratch Removel

Unit -4 Video Segmentation, Scene Change Detection, Spatiotemporal Change Detection, Motion Segmentation, Simultaneous Motion Estimation and Segmentation, Semantic Video Object Segmentation, Motion Tracking video, Object tracking 2D and 3D, Basic video coding digital video signals and formats, Compression Techniques, Block transform coding.

Unit -5 Test and Tutorial

Reference Books

1. The essential guide to Video processing by Alan C. Bovik, Elsevier Science
2. Handbook of Image and Video Processing, Alan Bovik, Academic Press
3. Video Processing and Communications, Yao Wang, Jorn Ostermann, Ya-Qin Zhang, Prentice Hall, 2002
4. Digital Video Processing, A. Murat Tekalp, Prentice Hall, edition 1, 1996
5. Practical Image & Video Processing using MATLAB by Oge Marques
6. Digital Video Processing for Engineers: A Foundation for Embedded Systems Design By Michael Parker, Suhel Dhanani
7. Video Coding for Mobile Communications, David Bull et al, Academic Press
8. Introduction to Data Compression, Khalid Sayood,
9. Data Compression: The Complete Reference, David Salomon

Course Code: CS-534 P **Course Title :** Practical based on D1.CS-532-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D1.CS-532-T.

(Video processing)

1. Read, process, write (or save few frames) and play a video file.
2. Reading and playing video files in different formats.
3. Read, process and display YUV video data.
4. Convert aspect ratio of video.
5. Object Detection
6. Video enhancement and noise removal
7. Noise removal from video.
8. Video compression

SEC-3(E)

Course code: CS-541P **Course Title: Aptitude and Reasoning**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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

SEC-3(F)

Course code: CS-541P T **Course Title: Website Hosting using Word Press**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

Fundamental knowledge of HTML, CSS & JavaScript

Course Outline

Unit -1 :

Website Planning & Development- Website, Types of Websites, Phases of website development, Keywords: Selection process

Unit – 2:

Domain & Web Hosting:- Domain, Types of Domain, Where to Buy Domain, Webhosting, How to buy Webhosting

Unit – 3:

Building Website using Word press-What is Word press, CMS, Post and Page

Unit – 4:

Word press Plug-ins- Different Plug-ins, social media Plug-ins, page builder plug-ins: the elementor, how to insert a section, how to insert logo, Google Micro sites

Unit – 5: Test and Tutorial

Reference Books:

1. Wordpress Web Hosting: How to Use Cpanel and Your Hosting Control Center: How To Use cPanel and Your Hosting Control Center by Kent Mauresmo, Matthew Pitt
2. Definitive Guide To WordPress Hosting by Harsh Agrawal, ShoutMeLoud
3. EASY WORDPRESS: Make Your Own Website For Free in 24 hours, by A. Nabil Rosli

B.Sc. (Computer Science)

Semester - VI

Curriculum for semester VI

DSE-1B (1)

Course code: CS-611 T **Course Title: A1: Java Web Frameworks**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

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 IntroductionWhat is Struts, Struts2 Features**, MVC** Model1 vs Model2,Struts2Core Components,InterceptorsValue**,**StackAction**,**ContextAction**,** InvocationOGNL 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: CS-613 P **Course Title : Practical based on B1 CS-611 T**
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of experiments to be carried out based on the course **A1 CS-611 T. (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.

DSE-1B (1)

Course code: CS-611 T **Course Title: B1. ASP.NET**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites
1. Concepts of Object oriented programming approach.

Learning Objectives

- The .NET has become a platform of choice for the development of web based data drivenpages among webpage developer community due to its potential and strong features available to develop virtually all kind of dynamic web sites.
- It is a popular platform for development of robust desktop and web based applications.
- tudents will be able to use ASP.NET platform for developing web based application with database support.
- Aim of this course is to enable students to develop dynamic and data driven web applications utilizing the power of .NET Technology.

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

- Explain the architecture of Dot Net platform
- Develop Simple Web form using various controls and implement the concept of master page
- Develop interaction of front end with database using facilities of .NET platform
- Deploy .Net Web Applications

Course Outline

Unit – 1: Introduction to .NET Framework and ASP.NET

Microsoft .NET framework Overview, .Net framework Architecture, .Net Framework components: (CLR, CLS, CTS, MSIL, NameSpace, JIT, Metadata, FCL, Assembly, GAC, GC, Memory Management), Features of ASP.NET, Differences between ASP.NET and Classic ASP. Web Applications and Webpage, Client Server Architecture, Parts Of website (HTML,XHTML, CSS, Client side and Server Side Scripting, Database), Creating simple Web Application in ASP.NET.

Unit – 2: ASP.NET Web Forms and Controls
Adding Controls to the Web Page, Types of ASP.NET Files, Page Life Cycle Web Form Processing, Stages(Roundtrip), ASP.Net In-Built Objects (Response, Request, Server, Trace Objects), Web Server Controls (Button, Check Box, Check Box List, Drop Down List, HyperLink, Image,Image Button, Label, Link Button, List Box, List Item, Panel, Place Holder, Radio Button, Radio Button List, Text Box) Working with Control Properties and Events, Validation Controls (Required Field Validator, RangeValidator Control, Compare Validator, RegularExpression Validator, Custom Validator, Validation Summary)

Unit – 3: Styles, Themes and Master pages, Styles, Creating Style Sheets, Applying Style Sheet Rules, Themes, How Themes Work, Handling Theme Conflicts, Creating Multiple Skins for the Same Control, Master Page, Basics of Master page, How Master page and Content pages are connected, Nesting Master Pages.Tuples and Sets: Creating Tuples, Basic Tuple Operations, Indexing and Slicing inTuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip () Function, Sets, Set Methods, Traversing of Sets, Frozenset.

Unit -4 : Connecting Database Using ADO.NET, ADO.NET Architecture, DataProvider, Connection Object, Command Object, DataReader Object, DataAdapter Object, DataSet, DataView, Data Binding, Types of data binding (Single Value, Repeated Value), SQL Data Source,Selecting, Updating and Deleting Records.

Unit– 5: Test and Tutorial

Reference Books :

1. ASP.NET: The Complete Reference Books by Matthew Macdonald , McGraw Hill education
2. Programming in Visual Basic. NET by Julia Case Bradley, Anita C. Millspaugh, McGraw Hill, latest edition
3. Visual Basic .net Comprehensive Concepts and Techniques by Shelly, cashman, Quasney, Cengage learning, 2012.

DSE-1B(1)

Course Code: CS-613 P **Course Title :** Practical based on B1.CS-611-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments to be carried out based on the course B1.CS-611-T. (**ASP.NET**)

a) Getting acquainted with Visual Studio environment. (create new web project, open existing web project, building website, and study of toolbars, menu etc.)
b) Develop simple application using .net facility
c) Design a web form to allow user to enter following details in his Resume using Web Server Controls. Set validations using properties. When data is submitted it must be viewed in the panel below the form. Fields of Resume are FirstName, Surname, Gender, Address, City, Pin code, Phone, Qualification (Diploma, Bachelor, Master), Specialization subject, Percentage.
d) Create a web form where user enters following marks. ASP.NET, JAVA, ISS, Project (All out of 100). When user submits the marks, numeric value validation must be done. On entering marks, the grade should be displayed in message box

% > 90 and <<=100 AA
> 80 and <<=90 AB
> 70 and <<=80 BB
> 60 and <<=67 BC
>50 and <<=60 CC
>40 and <= 50 DD
Else Fail

e) Create a web page using the concept of cascading style sheets in ASP.NET
f) Create a web page using the concept of Theme & Skin in ASP.NET
g) Create Home page of your website using master page concept
h) Create a simple web application to illustrate the concept of nesting master page in ASP.NET
i) Write sample application to connect to database (connection object), Fetching and inserting data from database (command object) and using Data Reader.
j) Create a Web page and test the connectivity of your database with biodata form in exercise 1. If connected, display the message that connection with database is successful, and redirect the user to his homepage
k) Create a login page in your web application. Login page must have user name and password fields. If user enters correct ID, Password, he must be redirected to the homepage of your website.
l) Create a webpage to display the information about user on his homepage once he has logged in through the login form.
m) Create a webpage to bind the user data from database into a gridview dynamically.
n) Create a simple web application that integrates the above concepts of ASP.NET into your application. Suggestive web application can be your own Personal website and host on free domain, Your department website etc,

DSE-1B (1)

Course code: CS-611 T **Course Title: C1. AWS(Amozon Web Services)**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- NA

Learning Objectives

- It presents a top-down view of cloud computing, from applications and administration to programming, infrastructure, billing and security.
- overview of cloud computing, cloud systems, Load balancing in AWS, distributed storage systems, virtualization, security in AWS, and management services and Billing.
- Students will study state-of-the-art solutions for cloud computing developed by Amazon.
- Students will also apply what they learn in one programming assignments and oneproject executed over Amazon Web Services.

Learning Outcomes

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

- To explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- To apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost by Load balancing approach.
- To discuss system virtualization and outline its role in enabling the cloud computing system model.
- To illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
- To analyze various cloud programming models and apply them to solve problems on the cloud.
- To understand various management and other distinguish services of AWS.
- To analyze the billing of resources and other paradigm: how to deal with disasters.
- To understand security and compliances for AWS.

Course Outline

Unit – 1: Introduction to AWS :- AWS history, AWS Infrastructure, AWS services, AWS ecosystem.Programming, management console and storage on AWS, Basic Understanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block store - Simple storage service, Glacier - Content delivery platforms.

Unit – 2 : AWS identity services - security and compliance, Users, groups, and roles - Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security - AWS compliance initiatives, Understanding public/private keys, Other AWS security capabilities.
AWS computing and marketplace ,Elastic cloud compute - Introduction to servers, Imaging computers, Auto scaling, Elastic load balancing, Cataloging the marketplace, AMIs,
Selling on the marketplace.

Unit – 3: AWS networking and databases, Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service – DynamoDB, ElastiCache, Redshift. Other AWS services

and management services, Analytics services, Application services, Cloud security, CloudWatch, CloudFormation, CloudTrail, OpsWorks.

Unit – 4 : AWS billing and Dealing with disaster, Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, Examining logs.

Unit– 5: Test and Tutorial

Reference Books :

1. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons. ISBN-13: 978-0470903568.
2. Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978-1118571835
3. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition
4. Amazon Security overview whitepaper-https://aws.amazon.com/whitepapers
5. IAM Getting started Guide http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html
6. Amazon.com Mashups by Francis Shanahan, Wrox, Wiley Publishing Inc.,
7. Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Dreamtech Press, ISBN: 9789351198758

DSE-1B(1)

Course Code: CS-613 P **Course Title :** Practical based on C1.CS-611-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments to be carried out based on the course C1.CS-611-T. (**AWS(Amozon Web Services)**)

1. Write pros and cons of Cloud Computing.
2. Summarize Cloud service models with real time examples.
3. Define Virtualization. Also list and explain different Hypervisors.
4. Discuss performance evaluation of service over cloud.
5. Software study on Hadoop, MapReduce and HDFS.
6. Create an AMI for Hadoop and implementing short Hadoop programs on the Amazon Web Services platform.
7. Create a scenario that use Amazon S3 as storage on cloud.

DSE-1B (1)

Course code: CS-611 T **Course Title: D1. Neural Network**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Nil

Learning Objectives

- To understand the aspects of fuzzy logic and neural network for any mechatronics applications.
- Concepts of fuzzy logic and neural network explore the area of machine learning to fine tune and improve the accuracy with automatic control structures.

Learning Outcomes

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

- Develop Fuzzy Inference System for various applications.
- Integrate and develop Neural Network for various applications.
- Judge the role played by Mechatronics engineers to automate the process by integrating the knowledge of soft-computing techniques.

Course Outline

Unit – 1: Introduction to soft computing: Introduction, Importance of Soft Computing, Main Components of Soft Computing, Fuzzy Logic, Artificial Neural Networks, Support Vector machine, Evolutionary Algorithms, Hybrid Intelligent Systems.

Unit – 2 : Fuzzy Logic Systems: Introduction to Fuzzy logic, classical sets vs fuzzy sets, Membership functions and its features, Properties and operations
on Fuzzy sets, classical relations vs Fuzzy relation, Operations of Fuzzy relation, Defuzzification, Fuzzy rule base and approximate reasoning, Fuzzy Inference Systems, Design a fuzzy logic controller: Mamdani &Sugeno Architecture.

Unit – 3: Neural Network Systems : Introduction to Artificial Neural Network, Biological neurons vs artificial neural network, Neuron models: McCulloch-Pitts Neuron, Hebb Network, Learning in neural networks: Supervised Learning Network – Perceptron, ADALINE, MADALINE, Back propagation network, Unsupervised Learning Network – Selforganizing Map, Learning Vector Quantization, Adaptive resonance theory.

Unit – 4 : Applications of soft computing : Fuzzy logic and neural network systems in Control System, Automation, Robotics and Machine Vision.

Unit– 5: Test and Tutorial

Reference Books :

(1) S. N. Sivanandam, S. N. Deepa, Principles of Soft computing, Wiley India Edition.
(2) Drinkov, An introduction to Fuzzy Control, Narosa Publication.
(3) Ke-Lin Du, Madisetti NS Swamy, Neural networks in a soft computing framework, Springer Science & Business Media.

DSE-1B(1)

Course Code: CS-613 P **Course Title : Practical based on D1.CS-611-T**

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments to be carried out based on the course D1.CS-611-T. (**Neural Network**)

1. Introduction to SCILAB/MATLAB: Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos
2. SCILAB/MATLAB simulation: Fuzzy Logic Controller (FLC) implementation.
3. SCILAB/MATLAB simulation: Simulink Fuzzy Logic Controller (FLC) implementation.
4. SCILAB/MATLAB simulation: Applications of FLC to Control System.
5. Introduction to SCILAB/MATLAB: Neural Network (NN) Toolbox, NN Simulink Demos
6. SCILAB/MATLAB simulation: Artificial Neural Network (ANN) implementation
7. SCILAB/MATLAB simulation: NN Tool Artificial Neural Network (ANN) implementation
8. SCILAB/MATLAB simulation: Various structure of NN algorithms implementation
9. SCILAB/MATLAB simulation: Training Algorithms of ANN.
10. SCILAB/MATLAB simulation: Application of NN to Control System

DSE-1B (2)

Course code: CS-612 T **Course Title: A2. Compiler Design**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Knowledge of Theory of Computation.

Learning Objectives

- Compiler Design is a fundamental/core subject of Computer Engineering. It teaches how Compiler of a Programming Language works.
- It also focuses on various designs of Compiler andstructuring and optimizing various phases of a Compiler.
- It is also necessary to learn types of Grammar, Finite state machines, lex, yacc and related concepts of languages.

Learning Outcomes

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

- Understand the basic concepts and application of Compiler Design
- Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyser , Intermediate Code Generation, Parser (Top Down and Bottom Up Design) and will able to understand strength of Grammar and Programming Language.
- Understand various Code optimization Techniques and Error Recovery mechanisms.
- Understand and Implement a Parser.

Course Outline

Unit – 1: Overview of the Translation Process, A Simple Compiler,Difference between interpreter, assembler and compiler. Overview and use of linker and loader, types of Compiler, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Lexical Analysis, Hard Coding and Automatic Generation Lexical Analyzers, Front-end and Back-end of compiler, pass structure

Unit – 2 : Lexical Analyzer Introduction to Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA.

Unit – 3: Parsing Theory Top Down and Bottom up Parsing Algorithms, Top-Down Parsing, Bottom-Up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes

Unit – 4 : Intermediate Code Generation Different Intermediate Forms, Syntax Directed Translation Mechanisms And Attributed Mechanisms And Attributed Definition. Code Generation Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs.

Unit– 5: Test and Tutorial

Reference Books :

1. Compilers: Principles, Techniques and Tools By Aho, Lam, Sethi, and Ullman, Second Edition, Pearson, 2014
2. Compilers: Principles, Techniques and Tools By Aho, Sethi, and Ullman, Addison-Wesley, 1986
3. Compiler Design in C By Allen I. Holub, Prentice-Hall/Pearson.

DSE-1B(2)

Course Code: CS-614 P **Course Title :** Practical based on A2.CS-612-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

List of Experiments: Compiler Design

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
2. Write a C program to identify whether a given line is a comment or not
3. Write a C program to test whether a given identifier is valid or not.
4. Write a C program to simulate lexical analyzer for validating operators
5. To Study about Lexical Analyzer Generator(LEX) and Flex(Fast Lexical Analyzer)
6. Implement following programs using Lex.
   a. Create a Lexer to take input from text file and count no of characters, no. of lines & no. of words.
   b. Write a Lex program to count number of vowels and consonants in a given input string.
7. Implement following programs using Lex.
   a. Write a Lex program to print out all numbers from the given file.
   b. Write a Lex program to printout all HTML tags in file.
   c. Write a Lex program which adds line numbers to the given file and display the same onto the standard output.
8. Write a Lex program to count the number of comment lines in a given C program. Also eliminate them and copy that program into separate file.
9. Write a C program for implementing the functionalities of predictive parser for the mini language.
10. Write a C program for constructing of LL (1) parsing.

DSE-1B (2)

Course code: CS-612 T **Course Title: B2. Data Warehouse**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- NA

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

DSE-1B(2)

Course Code: CS-614 P **Course Title :** Practical based on B2.CS-612-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B2. Data Warehouse

Laboratory work will be based on the above syllabus B2.CS-612-T**. (Data Warehouse)** with minimum 10 experiments to be incorporated.

DSE-1B (2)

Course code: CS-612 T **Course Title: C2. Distributed Database Management System**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Database Management Systems & Networking

Learning Objectives

- To introduction to Distributed DBMS and associated problems.
- Students will be able to understand various algorithms and techniques for managing distributed database.

Learning Outcomes

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

- Understand what is Distributed DBMS
- Understand various architectures of DDBMS
- Apply various fragmentation techniques given a problem
- Understand and calculate the cost of enforcing semantic integrity control
- How optimization techniques are applies to Distributed Database
- Learn and understand various Query Optimization Algorithms
- Understand various algorithms and techniques for deadlock and recovery in Distributed database

Course Outline

Unit – 1: Introduction: Distributed Data Processing, Distributed Database Systems, Promises of DDBSs, Complicating factors, Problem areas, Distributed DBMS Architecture : Models- Autonomy, Distribution, Heterogeneity DDBMS Architecture – Client/Server, Peer to peer, MDBS.

Unit – 2 : Data Distribution Alternatives: Design Alternatives – localized data, distributed data Fragmentation – Vertical, Horizontal (primary & derived), hybrid, general guidelines, correctness rules, Distribution transparency – location, fragmentation, replication, Impact of distribution on user queries – No Global Data Dictionary(GDD), GDD containing location information,
Example on fragmentation

Unit – 3: Semantic Data Control : View Management, Authentication – database authentication, OS authentication, Access Rights,Semantic Integrity Control – Centralized & Distributed , Cost of enforcing semantic integrity, Query Processing : Query Processing Problem, Layers of Query Processing Query Processing in Centralized Systems – Parsing & Translation, Optimization, Code generation, Example Query Processing in Distributed Systems – Mapping global query to local, Optimization,

Unit – 4 : Optimization of Distributed Queries: Query Optimization, Centralized Query Optimization, Join Ordering Distributed Query Optimization Algorithms, Distributed Transaction Management & Concurrency Control: Transaction concept, ACID property, Objectives of transaction management, Types of transactions, Objectives of Distributed Concurrency Control,Concurrency Control anomalies, Methods of concurrency control,Serializability and recoverability, Distributed Serializability, Enhanced lock based and timestamp based protocols, Multiple granularity, Multi version schemes, Optimistic Concurrency Control techniques, Distributed Deadlock & Recovery

Unit– 5: Test and Tutorial

Reference Books :

1. Principles of Distributed Database Systems, Ozsu, Pearson Publication
2. Distributed Database Mangement Systems, Rahimi & Haug, Wiley
3. Distributed Database Systems, Chanda Ray, Pearson Publication
4. Distributed Databases, Sachin Deshpande, Dreamtech

Course Code: CS-614 P **Course Title :** Practical based on C2.CS-612-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

List of Experiments: Distributed Database Management Systems

1. Create two databases either on single DBMS and Design Database to fragment and share the fragments from both database and write single query for creating view.
2. Create two databases on two different computer systems and create database view to generate single DDB.
3. Create various views using any one of examples of database and Design various constraints.
4. Write and Implement algorithm for query processing using any of Example in either C /C++ /Java / .NET
5. Using any of example, write various Transaction statement and show the information about concurrency control [i.e. various lock's from dictionary] by executing multiple update and queries.
6. Using Transaction /commit rollback, Show the transaction ACID properties.
7. Write java JDBC program and use JTA to show various isolation level's in transaction.
8. Implement Two Phase Commit Protocol
9, Case study on noSQL

DSE-1B (2)

Course code: CS-612 T **Course Title: D2. Deep Learning**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Basic concepts of statistics.

Learning Objectives

- To explore deep learning from scratch or broaden their understanding of deep learning. It covers the conceptual and practical, hands-on exploration of topics in deep learning.
- To build practical intuition about the core ideas of machine learning and deep learning.

Learning Outcomes

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

- Understand the deep neural networks methodologies.
- Apply the deep learning methods with parameter tuning on computer vision applications.
- Apply the deep learning methods with parameter tuning on text and sequences data.
- Analyze different deep learning methods in varying conditions of the applications.
- Evaluate the performance of different deep learning methods.

Course Outline

Unit – 1: Deep Neural Networks - A first look at a neural network, Data representations for neural networks, The gears of neural networks: tensor operations, The engine of neural networks: gradient-based optimization, Anatomy of a neural network, Introduction to Keras, Setting up a deep-learning workstation, Classifying movie reviews: a binary classification example, Classifying newswires: a multiclass classification example, Predicting house prices: a regression example.

Unit – 2 : Deep Learning for Computer Vision - Introduction to convenets, The convolution operation, The max-pooling operation, Training a convnet from scratch on a small dataset, The relevance of deep learning for small-data problems, Downloading the data, Building your network, Data preprocessing, Using data augmentation, Using a pretrained convnet, Feature extraction, Fine-tuning, Visualizing what convnets learn, Visualizing intermediate activations, Visualizing convnet filters, Visualizing heatmaps of class activation.

Unit – 3 : Deep Learning for Text and Sequences Working with text data, One-hot encoding of words and characters, Using word embeddings, Putting it all together: from raw text to word embeddings, Understanding recurrent neural networks, A recurrent layer in Keras, Understanding the LSTM and GRU layers, A concrete LSTM example in Keras, Advanced use of recurrent neural networks, A temperature-forecasting problem, Preparing the data, A common-sense, non-machine-learning baseline, A basic machine-learning approach, A first recurrent baseline, Using recurrent dropout to fight overfitting, Stacking recurrent layers, Using bidirectional RNNs.

Unit – 4 : Recent Trends in the methodological and application areas of Deep Learning.

Unit– 5: Test and Tutorial

Reference Books :

1. Deep Learning with Python by Francois Chollet Manning Publications Co., Latest Edition
2. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron An MIT Press book
3. Neural Networks and Deep Learning by Michael Nielsen
http://neuralnetworksanddeeplearning.com
4. Pattern Classification by Richard O. Duda, Peter E. Hart, David G. Stork John Wiley & Sons Inc

Course Code: CS-614 P **Course Title :** Practical based on D2.CS-612-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D2. Deep Learning.

Laboratory work will be based on the above syllabus D2.CS-612-T**. (Deep Learning)** with minimum 10 experiments to be incorporated.

DSE-2B (1)

Course code: CS-621 T **Course Title: A1.Software Quality Assurance & Testing**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

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, **C**omponents 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: CS-623 P **Course Title :** Practical based on A1.CS-621-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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

DSE-2B (1)

Course code: CS-621 T **Course Title: B1. GIS and Remote Sensing**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Nil

Learning Objectives

- To develop a basic understanding about Geo-Spatial techniques and its applications.
- To enable the students to apply the tools to solve various problems.

Learning Outcomes

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

- Observe, Identify and define simple/ complex problems of day to day lives
- present in Industry/ Society where GIS and Remote Sensing applications can be useful.
- Apply knowledge of basic image interpretation and data image processing.
- Integrate the existing data through various observations from various angles and layer creation.
- Apply problem-solving methodologies to generate, evaluate and justify
- innovative solutions by designing and conducting/ analyzing and interpreting the data.

Course Outline

Unit – 1: FUNDAMENTAL OF REMOTE SENSING: Definition –Components of Remote Sensing –Active and Passive Remote Sensing – Electro Magnetic Spectrum – Interaction of EMR With the Earth's Surface – Interactions with the Atmosphere Energy Sources and Radiation. Active and Passive Remote Sensting. Energy Interaction in the Atmosphere. Energy Interaction with the Earth Surface Features. Data Acquisition and Recording. Remote Sensing Data Products.

Unit – 2 : IMAGE INTERPRETATION AND DIGITAL IMAGE PROCESSING - Introduction to Digital Image and Imaging Sensors- Data Formats of Digital Image- Display of Digital Image - Image Processing Systems – Strategies – Keys – Equipments – Digital Image Processing – Rectification and Restoration – Enhancement of Image – Image Transformation, Classification and Analysis.

Unit – 3: GEOGRAPHIC INFORMATION SYSTEM - Introduction to GIS- Definitions of GISand related terminology - Components of GIS – GIS Data – Georeferenced data – Components of GIS- Data input and output –Data quality and Management – GIS analysis functions – Retrieval – Reclassification –- Buffering and Neighbourhood – Overlaying – Data Output – Implementation of GIS- GIS Analysis functions.

Unit – 4 : SOFTWARE - GIS and Image interpretation Software – Salient features – Capabilities and Limitations. Data management in different GIS software- Spatial Data Models- Attribute Data Management APPLICATIONS - Application of Remote Sensing / GIS– Case studies. GIS and Remote Sensing – Usefulness in Civil Engineering.

Unit– 5: Test and Tutorial

Reference Books :

1. Lilliesand T.M. and Kiefer R.W., Remote Sensing and image Interpretation , John Wiley and Sons, New York, 2004.

2. Burrrough P.A and McDonnel R.A., Principles of Geographic Information Systems, Oxford university press, 1998

3. A.M. Chandra and S.K. Ghosh,Remote Sensing and Geographical information System, Narosa Publishing House, New Delhi, 2006

4. BhattaB.,Remote Sensing and GIS, Oxford University Press, New Delhi, 2008

5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.

6. Agrawal N.K., Essentials of GPS, Spatial Network Pvt. Ltd., Hydrabad, 2004.

7. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008

8. Manual of Remote Sensing (Edited), Series of volumes.

9. Lo C.P. and Yeung Albert K.W., Concepts and Techniques of Geographical Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi, 2006

DSE-2B(1)

Course Code: CS-623 P **Course Title :** Practical based on B1.CS-621-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1. GIS and Remote Sensing

Laboratory work will be based on the above syllabus B1.CS-621-T**. (GIS and Remote Sensing)** with minimum 10 experiments to be incorporated.

DSE-2B (1)

Course code: CS-621 T **Course Title: C1. Ethical Hacking**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites :- Computer Networking

Learning Objectives

- The security of digital infrastructure is an utmost need for an organization. The variety of security attacks makes it compulsion to analyse the way newer attacks are formed and their understanding is important to prevent or detect such attacks.
- The ethical hacking covers the theory and practices of finding the vulnerabilities through forming the different attacks and then defining the appropriate security policy including the action to detect or prevent the attacks and thus reduce the damages.

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

- Describe and understand the basics of the ethical hacking
- Perform the foot printing and scanning
- Demonstrate the techniques for system hacking
- Characterize the malware and their attacks and detect and prevent them
- Determine the signature of different attacks and prevent them
- Detect and prevent the security attacks in different environments

Course Outline

Unit – 1: An Introduction to ethical Hacking : Security Fundamental, Security testing, Hacker and Cracker, Descriptions, Test Plans-keeping It legal, Ethical and Legality, **The Technical Foundations of Hacking:** The Attacker's Process, The Ethical Hacker's Process, Security and the Stack

Unit – 2 : Footprinting and scanning : Information Gathering, Determining the Network Range, Identifying Active Machines, Finding Open Ports and Access Points, OS Fingerprinting Services, Mapping the Network Attack Surface, Enumeration and System Hacking.

Unit – 3 : Malware Threats : Viruses and Worms, Trojans, Covert Communication, Keystroke Logging and Spyware, Malware Counter measures, **Sniffers, SessionHijacking and Denial of Service :** Sniffers, Session Hijacking, Denial of Service and Distributed.

Unit – 4 : Web Server Hacking, Web Applications and Database Attacks: Web Server Hacking, Web Application Hacking, Database Hacking, Wireless Technologies, **Mobile Security and Attacks :** Wireless Technologies, Mobile Device Operation and Security, Wireless LANs, Intrusion Detection Systems, Firewalls, Honeypots

Unit– 5: Test and Tutorial

Reference Books :
1. Certified Ethical Hacker, Version 9, Second Edition, Michael Gregg, Pearson IT Certification
2. Hacking the Hacker, Roger Grimes, Wiley
3. The Unofficial Guide to Ethical Hacking, Ankit Fadia, Premier Press

Course Code: CS-623 P **Course Title :** Practical based on C1.CS-621-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

List of Experiments: Ethical Hacking

1. List the tools for Ethical Hacking.
2. Implement Footprinting and Reconnaissance using tools 3d Traceroute, Alchemy Eye, DNS Tools and Network Solution Whois.
3. Implement Network Scanning using tools Advanced Port Scanner, Colasoft Ping Tool, Hide Your IP Address, Nessus and Nmap.
4. Implement Enumeration using tools Default Password List, Default Password List, OpUtil Network Monitoring Tool and OpUtil Network Monitoring Tool.
5. Implement system hacking using tools Actual spy, Alchemy Remote Executor, Armor Tool and F-Secure BlackLight.
6. Implement Trojan and Backdoors using tools Absolute Startup Manager, Absolute Startup Manager, Netwirx Services Monitor and StartEd Lite.
7. Implement Viruses and Worms using tools Anubis AnalyzingUnknownBinaries, Filterbit, Sunbelt CWSandbox and ThreatExpert.
8. Implement sniffers using tools Colasoft Capsa Network Analyzer, EffeTech HTTP Sniffer, Packet Sniffer and PRTG Network Monitor.

DSE-2B (1)

Course code: CS-621 T **Course Title: D1.Cryptography & Network security**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Mathematical concepts

Learning Objectives

- Use of the Internet for various purpose including social, business, communication and other day to day activities has been in common place.
- The information exchanged through Internet plays vital role for their owners and the security of such information/data is of prime importance.
- Knowing the concepts, principles and mechanisms for providing security to the information/data is very important for the students of Computer Science and technology.
- It concern to information security like symmetric and asymmetric cryptography, hashing, message and user authentication, digital signatures, key distribution and overview of the malware technologies.

Learning Outcomes

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

- Define terms related to cryptography, hashing, message authentication code, digital signature.
- Describe and discuss symmetric key cryptography algorithms, public key cryptography algorithms, hashing algorithms, Message authentication code generation algorithms, digital signature algorithms, key generation and key management, issues in web security and solution, issues in Transport layer security and solution.
- Demonstrate the generation of keys and execution of symmetric and public key algorithms from given data.
- Implement cryptography solution for given security problem.

Course Outline

Unit – 1: Introduction – Security services, security services, security mechanisms Finite fields – group, ring, fields, modular arithmetic, The Euclidean algorithm. Symmetric Cipher Model, Cryptography, Cryptanalysis and Attacks; Substitution and Transposition techniques.

Unit – 2 : Stream ciphers and block ciphers, Block Cipher structure, Data Encryption standard (DES) with example, strength of DES, Design principles of block cipher, AES with structure, its transformation functions, key expansion, example and implementation. Multiple encryption and triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode.

Unit – 3: Cryptographic Hash Functions, their applications, Simple hash functions, its requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA). Message Authentication Codes, its requirements and security,

Unit – 4 : Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm. Key management and distribution, symmetric key distribution using symmetric and asymmetric encryptions,

Unit– 5: Test and Tutorial

Reference Books :

1. Cryptography And Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition
3. Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill
4. Cryptography and Network Security Atul Kahate, TMH
5. Cryptography and Security, C K Shyamala, N Harini, T R Padmanabhan, Wiley-India
6.Information Systems Security, Godbole, Wiley-India
7. Information Security Principles and Practice, Deven Shah, Wiley-India
8. Security in Computing by Pfleeger and Pfleeger, PHI
9. Build Your Own Security Lab : A Field Guide for network testing, Michael Gregg, Wiley India

DSE-2B(1)

Course Code: CS-623 P **Course Title :** Practical based on D1.CS-621-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D1. Cryptography and Network security

Laboratory work will be based on the above syllabus D1.CS-621-T**. (Cryptography and Network security)** with minimum 10 experiments to be incorporated.

DSE-2B(2)

Course code: CS-622 T **Course Title: A2. Linux Administration**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites :- Linux O.S.

Learning Objectives

- Demonstrate proficiency with the Linux command line interface, directory & file management techniques, file system organization, and tools commonly found on most Linux distributions.
- Effectively operate a Linux system inside of a network environment to integrate with existing service solutions.
- Demonstrate the ability to troubleshoot challenging technical problems typically encountered when operating and administering Linux systems.

Learning Outcomes

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

- Learner will be able to develop Linux based systems and maintain.
- Learner will be able to install appropriate service on Linux server as per requirement.
- Learner will have proficiency in Linux server administration.

Course Outline

Unit – 1: Introduction: Technical Summary of Linux Distributions, Managing Software Single-Host Administration: Managing Users and Groups, Booting and shutting down processes, File Systems, Core System Services, Process of configuring, compiling, Linux Kernel.

Unit – 2 : Networking and Security: TCP/IP for System Administrators, basic network Configuration, Linux Firewall (Netfilter), System and network security.

Unit – 3: Internet Services: Domain Name System (DNS), File Transfer Protocol (FTP), Apache web server, Simple Mail Transfer Protocol (SMTP), Post Office Protocol and Internet Mail Access Protocol (POP and IMAP), Secure Shell (SSH), Network Authentication, OpenLDAP Server, Samba and LDAP, Network authentication system (Kerberos), Domain Name Service (DNS), Security

Unit – 4 : Intranet Services: Network File System (NFS), Samba, Distributed File Systems (DFS), Network Information Service (NIS), Lightweight Directory Access Protocol (LDAP), Dynamic Host Configuration Protocol (DHCP), MySQL, LAMP Applications File Servers, Email Services, Chat Applications, Virtual Private Networking.

Unit– 5: Test and Tutorial

Reference Books :

1. Beginning Linux by Neil Mathew 4 th Edition
2. Red hat Linux Networking and System Administration by Terry Collings
3. UNIX: Concepts and techniques, S. Das, Tata McGraw-Hill,
4. Linux Administration: A Beginner's Guide, Fifth Edition, Wale Soyinka, Tata McGraw-Hill
5. Linux: Complete Reference, 6 th Edition, Richard Petersen, Tata McGraw-Hill

DSE-2B(2)

Course Code: CS-624 P **Course Title :** Practical based on A2.CS-622-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

List of Experiments:

1. Installation of Fedora/Ubuntu Linux operating system.
a. Partitioning drives
b. Configuring boot loader (GRUB/LILO)
c. Network configuration
d. Setting time zones
e. Creating password and user accounts
f. Shutting down
2. Software selection and installation
3. Programming Shell scripts for Linux administration
4. Linux system administration
a. Becoming super user
b. Temporarily changing user identity with su command
c. Using graphical administrative tools
d. Administrative commands
e. Administrative configuration files
5. Connecting to the internet and configuring samba
a. Setting up dial-up PPP
b. Creating a dial- up connection with the internet configuration wizard
c. Launching PPP connection
d. Setting up linux as a proxy server
e. Configuring mozilla or firefox to use as a proxy
6. Setting up local area network
a. LAN topologies
b. LAN equipment
c. Networking with TCP/IP
d. Configuring TCP/IP
e. Adding windows computer's to user LAN
f. IP address classes
7. Server setup and configuration
a. Setting up NFS file server
b. Setting up Samba file server
c. The Apache web server
d. Setting up FTP server
e. Setting up proxy server
8. Understanding COMPUTER SECURITY: Firewall and security configurations
a. LINUX security checklist
b. Securing linux with IP table firewalls
c. Configuring an IP table firewall
d. Securing Linux features
9. Programming using C.
10. Implementing Socket programs.
11. Setting up hardware devices including sound card and printers and others (USB devices etc).
12. Working with X-windows: a. Switching between text and graphical consoles
b. set up my video card, monitor and mouse for the X-server.
c. Install KDE, change default desktop to KDE (or Gnome)
d. Installing TrueType fonts from my MS Windows partition.
e. Display and Control a Remote Desktop using VNC.

DSE-2B(2)

Course code: CS-622 T **Course Title: B2. Advance Data Science**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites : Basic data Science

Learning Objectives

.Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight.

.To introduce students to the collection, Preparation, analysis, modelling and visualization of data, covering both conceptual and practical issues.

.Examples and case studies from diverse fields will be presented, and hands-on use of statistical and data manipulation software will be included

Learning Outcomes

After learning the course the students should be able to:

.Recognize various disciplines that contribute to a successful data science effort.

.Identify the data types, relation between data and visualization technique for data.

.Explain probability, distribution, sampling, Estimation

.Solve regression and classification problem.

.Develop and appreciate various techniques for data modelling and mining.

Course Outline :

Unit – 1 Introduction to Probability, Introduction to Probability Theory, Probability Theory – Terminology, Fundamental Concepts in Probability – Axioms of Probability, Application of Simple Probability Rules – Association Rule Learning, Bayes' Theorem, Random Variables Probability Density Function (PDF) and Cumulative Distribution Function (CDF) of a Continuous Random Variable, Binomial Distribution, Poisson Distribution, Geometric Distribution, Parameters of Continuous Distributions, Uniform Distribution, Exponential Distribution, Chi-Square Distribution, Student's t-Distribution, F-Distribution.

Unit – 2 Sampling and Estimation, Introduction to Sampling, Population Parameters and Sample Statistic, Sampling, Probabilistic Sampling, Non-Probability Sampling, Sampling Distribution, Central Limit Theorem (CLT), Sample Size Estimation for Mean of the Population, Estimation of Population Parameters, Method of Moments, Estimation of Parameters Using Method of Moments, Estimation of Parameters Using Maximum Likelihood Estimation,

Unit – 3 simple Linear Regression, Introduction to Simple Linear Regression, History of Regression–Francis Galton's Regression Model, Simple Linear Regression Model Building, Estimation of Parameters Using Ordinary Least Squares, Interpretation of Simple Linear Regression Coefficients, Validation of the Simple Linear Regression Model,Outlier Analysis, Confidence Interval for Regression Coefficients b0 and b, Confidence Interval for the Expected Value of Y for a Given X, Prediction Interval for the Value of Y for a Given X.

Unit – 4 Logistic Regression, Introduction – Classification Problems, Introduction to Binary Logistic Regression, Estimation of Parameters in Logistic Regression, Interpretation of Logistic Regression Parameters, Logistic Regression Model, Diagnostics, Classification Table, Sensitivity, and Specificity, Optimal Cut-Off Probability, Variable Selection in Logistic Regression, Application of Logistic Regression in Credit Rating, Gain Chart and Lift Chart

Unit - 5 Test and Tutorial

Reference Books:-

1. Dinesh Kumar, Business Analytics, Wiley IndiaBusinenalytics: The Science
2. V.K. Jain, Data Science & Analytics, Khanna Book Publishing, New Delhi of Dat
3. Data Science For Dummies by Lillian Pierson , Jake Porway
4) Doing Data Science by Rachel Schutt, Cathy O'Neil, O’Reilly publication
5) Data Science with Jupyter Author: Prateek Gupta, BPB publication

DSE-2B(2)

Course Code: CS-624 P **Course Title :** Practical based on B2.CS-622-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B2.**CS-622-T**. (**Advance Data Science)**

1. Perform descriptive analysis and identify the data type.
2. Implement a method to find out variation in data. For example the difference between highest and lowest marks in each subject semester wise.
3. Plot the graph showing result of student in each semester.
4. Plot the graph showing the geographical location of students.
5. Plot the graph showing number of male and female students.
6. Implement a method to treat missing value for gender and missing value for marks.
7. Implement linear regression to predict the 5 th semester result of student.
8. Implement logistic regression and decision tree to classify the student as average or clever.

DSE-2B(2)

Course code: CS-622 T **Course Title: C2.Advanced Networking Protocols**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites : Basic Networking Protocols

Learning Objectives

- The major components of computer based information systems is computer networks. Through computer networks we can share hardware, Software, Processing, Data and Applications besides getting global connectivity for internet based communication and services.
- To make students learn the technology of establishing, commissioning (making operational) and maintaining computer networks.

Learning Outcomes

After learning the course the students should be able to :

- Identify the computer network topologies and its features.
- Understand routing algorithms and routing techniques.

Course Outline :

Unit – 1 Protocols and Interfaces in Upper Layers of TCP/IP : Introducing, TCP/IP suite, Explaining Network Layer Protocols, Explaining Transport, Layer Protocol, Explaining Application Layer Protocol, Routing in the Internet :Introduction to Intra-domain and inter-domain routings, Unicast Routing Protocols, Multicast Routing Protocols.

Unit – 2 Network Management and Services : Introduction to Network Management, Standard Network Management Protocol, **Traffic Engineering Basics :** Introduction to traffic Engineering, Requirement Definition for Traffic Engineering, Traffic Sizing, Traffic Characteristics, Protocols, Time and Delay Consideration, Connectivity, Availability, Reliability, and Maintainability, Throughput Calculation

Unit – 3 Multimedia over Internet : Introduction to Multimedia Services, Explaining Transmission of Multimedia over the Internet, Explaining IP Multicasting, Explaining VOIP

Unit – 4 Bluetooth : Bluetooth Architecture, Bluetooth Applications, The Bluetooth Protocol Stack, The Bluetooth Frame Structure.

Unit - 5 Test and Tutorial

Reference Books:-

1. Advance Computer Network, By Dayan and Ambawade, Dr. Deven shah,Prof. Mahendra Mehra, Wiley India
2. High-Speed Networks and Internets, Performance and Quality of Service,Second Edition, William Stallings, Pearson
3. TCP/IP Protocol Suite by Behrouz A. Forouzan
4. Computer Networks, Andrew Tanenbaum, 5th Edition, Pearson Education.

DSE-2B(2)

Course Code: CS-624 P **Course Title :** Practical based on C2.CS-622-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course C2.**CS-622-T**. (**Advanced Networking Protocols)**

1. To study about simple TCL example in NS2.
2. Calculate & plot the graph of throughput for simple.tcl by using NS2 (AWK script).
3. To study about TCP Flavors and their comparison in NS2.
4. To create wireless topology for Five nodes using NS2.
5. To create wired cum wireless topology using NS2.
6. Introduction to Bluetooth

Design based Problems (DP)/Open Ended Problem:

1. Router installation and study of specifications and Router configuration of campus/institute
2. Prepare the presentation and report on different network.
3. Learning of Linux commands for network

Major Equipment:

1. Linux based computer system
2. Network simulator software

DSE-2B(2)

Course code: CS-622 T **Course Title: D2. Fuzzy System**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites :- Mathematical background, Programming skill in C, C++.

Learning Objectives

- To apply the soft computing techniques for solving the problem.
- To learn fuzzy logic and applications.
- To solve single-objective optimization and its applications using GAs.
- To understand the Artificial neural network and its applications.

Learning Outcomes

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

- Develop the fuzzy logic sets and membership function and defuzzification techniques.
- Comprehend soft computing techniques and its applications.
- understand concept of fuzzy logic.
- do programming of fuzzy logic.

Course Outline

Unit – 1: Introduction of fuzzy logic, Fuzzy sets, Membership functions, Fuzzification, Membership value assignment.

Unit – 2 : Defuzzufication, Fuzzy Rule base, Fuzzy Inference system, Fuzzy Decision making

Unit – 3: Fuzzy Control, Convention control systems, Fuzzy logic control vs. PID control, Stability.

Unit – 4 : Application of fuzzy logic: Power plants, Industrial Control, AC Induction motor control, Traffic control, water treatment system, Chilling systems, Washing machine Control, Fuzzy logic in DCS &PLC, Industrial Index motion control, Automatic generation control, power control, Automotive applications, Drying process control.

Unit– 5: Test and Tutorial

Reference Books :

1. Introduction of fuzzy logic using matlab, S.N. Sivananddam, S. N. Deepa, Dr. S. Sumathi, Springer Publication, 2007
2. Introduction to applied Fuzzy electronics by Ahmad M. Ibrahim, Prentice-Hall of india.
3. Fuzzy logic for embedded systems application by Ahmad M. Ibrahim, Elsevier science, USA, 2004
4. Computational Intelligence Paradigms by S. Sumathi, Surekha P. CRC press, Taylor and Francis Publication, 2011.
5. Fuzzy Logic Intelligence, Control and Information by John Yen, Reza Langar, Pearson Education, 2003
6. Neural networks, fuzzy logic, and genetic Algorithms by S. Rajasekaran, G.A. Vijayalakshmi Pai , PHI Learning Publication, 2014
7. Neuro-Fuzzy and Soft computing, A computational Approach to learning and machine intelligence by J. Jang, T. Sun and E. Mizutani, Prentice Hall Publication, 2011.
8. Introduction to fuzzy sets, fuzzy logic & Fuzzy control systems by G. Chen and T. Pham, CRC Press, 2001.

DSE-2B(2)

Course Code: CS-624 P **Course Title :** Practical based on D2.CS-622-T
Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

List of Experiments:

1. Study of fuzzy logic tool in any technical programming language.
2. Study of membership functions.
3. Study of defuzzification methods.
4. Study of Fuzzy PID control.
5. Study and design fuzzy logic control for level control.
6. Study of fuzzy base washing machine control.
7. Study of temperature control in shower.
8. Study of temperature control in reactor.
9. Study of motor control using LabVIEW base fuzzy logic.
10. Study of fuzzy control in PLC.

DSE-3B(1)

Course code: CS-631 T **Course Title: A1. Machine Learning**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites :- Programming and Data Structure, Algorithms and Statistics

Learning Objectives

- To introduce the students with concepts of machine learning,
- machine learning algorithms and building the applications using machine leaning for various domains.

Learning Outcomes

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

- Explore the fundamental issues and challenges in Machine Learning including data and model selection and complexity.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms
- Evaluate the various Supervised Learning algorithms using appropriate Dataset.
- Evaluate the various unsupervised Learning algorithms using appropriate Dataset.
- Design and implement various machine learning algorithms in a range of real-world applications.

Course Outline

Unit – 1: Introduction to Machine Learning: Overview of Human Learning and Machine Learning, Types of Machine Learning, Applications of Machine Learning , Tools and Technology for Machine Learning. **Preparing to Model:** Machine Learning activities, Types of data in Machine Learning, Structures of data, Data quality and remediation, Data Pre-Processing: Dimensionality reduction, Feature subset selection.

Unit – 2 : Modelling and Evaluation: Selecting a Model: Predictive/Descriptive, Training a Model for supervised learning, model representation and interpretability, Evaluating performance of a model, Improving performance of a model. **Basics of Feature Engineering:** Feature and Feature Engineering, Feature transformation: Construction and extraction, Feature subset selection : Issues in high-dimensional data, key drivers, measure and overall process.

Unit – 3: Bayesian Concept Learning: Impotence of Bayesian methods, Bayesian theorem, Bayes' theorem and concept learning, Bayesian Belief Network.

Unit – 4 : Supervised Learning: Classification and Regression: Supervised Learning, Classification Model, Learning steps, Classification algorithms, Regression, Regression algorithms,

Unit– 5: Test and Tutorial

Reference Books :

1. Machine Learning, Saikat Dull, S. Chjandramouli, Das, Pearson
2. Machine Learning with Python for Everyone, Mark Fenner, Pearson
3. Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
4. Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley
5. Python Machine Learning, Sebastian Raschka, Vahid Mirjalili, Packt Publishing

DSE-3B(1)

Course Code: CS-633 P **Course Title :** Practical based on A1.CS-631-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course A1. machine learning.

Laboratory work will be based on the above syllabus A1.CS-631-T**. (machine learning)** with minimum 10 experiments to be incorporated.

DSE-3B(1)

Course code: CS-631 T **Course Title: B1. Cyber Crime & Mitigation**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites :- NA

Learning Objectives

- To explores technical, legal, and social issues related to cybercrime.
- The origins and extent of cybercrime, responses from legal systems to cyber-criminals, and the social impact of cybercrimes will be addressed.
- To implementation of firewalls for different operating systems and at different layers of network architecture.
- To explores mitigation at various stages of operating systems, network and endpoint.

Learning Outcomes

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

- To identify and describe the major types of cybercrime.
- To understand the law with regards to the investigation and prosecution of cyber criminals.
- To configure operating system security, privacy, and patching - On Windows, MacOS and Linux.
- To Configure firewalls on all platforms for all types of attack scenarios.
- To diversify technologies offered by end-point-protection software, from traditional approaches, through to next generation and future technology.

Course Outline

Unit – 1: Cyber Crimes: Definition and Origin of the Word, Cyber Crime and Information Security, Who are Cyber Criminals, Classification of cyber crimes, E-mail Spoofing, Spamming, Forgery, Hacking, Online Fruads, Software Piracy, Computer Sabotage Email Bombing, Computer Network Intrusion, Password Sniffing, Credit Card Frauds, Phishing, vishing, Identity Theft, Social Engineering, CPU Hijackers, Darknets and Dark Markets.

Unit – 2 : Definition and Terminology (Information Technology Act, 2000): Cyber Crime : The Legal Perspectives, The Cyber Crime Indian Perspectives, The Cyber Crime And Indian ITA 2000/2001, Hacking and Indian Laws, **Firewalls:** Windows Host based Firewall, Windows Firewall Control, Linux Host based Firewalls-iptables, UFW, gufw&nftables, Mac - Host based Firewalls – pflist, Icefloor& Murus, Little Snitch, Network based firewalls -Routers – DD- WRT,Hardware, pfSense, Smoothwall and Vyos.

Unit – 3: Operating System Security and Privacy: Security features and functionalities, Security bugs and vulnerabilities, OS Privacy and Tracking, General Use Operating Systems With a Security and Privacy Focus, **Network Security**: Network Attacks and Network Isolation, Wi-Fi Weaknesses, Wi-Fi Security Testing- Secure Configuration and Network Isolation, Network Monitoring for threats,

Unit – 4 : End Point Protection: File and Disk Encryption, Next Generation - Anti-Virus (NG-AV) & End-Point- Protection (NG-EPP), End Point Protection Technology, Threat Detection and Monitoring, Email- Security and Privacy Messengers - Security and Privacy.

Unit– 5: Test and Tutorial

Reference Books :

1. Cyber Security : Understanding Cyber Crimes , Computer Forensics and Legal Perspectives By Nina Godbole, Sunit Belapur , Wiley

2. Understanding Cyber Crime: Phenomena and Legal Challenges Response, ITU 2012

3. Building Internet Firewalls: Internet and Web Security by Elizabeth D. Zwicky, Simon Cooper, , D. Brent Chapman, Addison -Wesley Professional Computing Series

4. Penetration Testing with Shellcode: Detect, exploit, and secure network-level and operating system vulnerabilities by Hamza Megahed ,Packt Publishing Publisher

5. Network Monitoring and Analysis: A Protocol Approach to Troubleshooting by Ed Wilson, Prentice Hall publisher (January 9, 2000)

6. Symantec Endpoint Protection Standard Requirements by Gerardus Blokdyk,5 STAR Cooks publisher.

DSE-3B(1)

Course Code: CS-633 P **Course Title :** Practical based on B1.CS-631-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course B1. Cyber Crime & Mitigation

Laboratory work will be based on the above syllabus B1.CS-631-T**. (Cyber Crime & Mitigation)** with minimum 10 experiments to be incorporated.

DSE-3B(1)

Course code: CS-631 T **Course Title: C1. Software Project Management-II**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

.**CS-531 T Software Project Management-I**

Learning Objectives

.Project Management is the discipline of defining and achieving targets while optimizing the use of resources (time, money, people, materials, energy, space, etc) over the course of a project (a set of activities of finite duration).

.It will also involve definite specifications and workings of an organization through proper planning.

.Project management in generally complex as it has multi- disciplinary areas included in various phases of its life span.

.A project is a series of task that is carefully planned to achieve a particular outcome.

Learning Outcomes

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

.Define software Project Management and its importance.
.Describes the characteristics of software projects.
.Describes projects and its attributes.
.Compares software Project with other projects.
.Differences between project management and contract management.
.Outlines the roles and responsibilities of Project managers.
.Explains in detail Project Management life.
.Categories software Project.
.Explains in details Project Charter.
.

Course Outline

Unit -1 Activity Planning: Introduction, Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Backward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities, Activity-on-Arrow Networks. **Risk Management:** Introduction, Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management, Evaluating Risks to the Schedule, Boehm‟s Top 10 Risks and Counter Measures, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts.

Unit -2 Monitoring and Control: Introduction, Creating the Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Software Configuration Management (SCM).
Managing Contracts: Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.

Unit -3 Managing People in Software Environments: Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the

Best Methods, Motivation, The Oldham–Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety, Some Ethical and Professional Concerns.

Unit -4Working in Teams: Introduction, becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leadership. **Software Quality**: Introduction, The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product versus Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans. **Project Closeout:** Introduction, Reasons for Project Closure, Project Closure Process, Performing a Financial Closure, Project Closeout Report.

Unit -5 Test and Tutorial

Reference Books

1.Project management, planning and control by Pritam Lanjewar, Dr. UmeshKumar Malpani. Scientific International Publishing House.

2.Software Project Management . Bob Hughes, Mike Cotterell, Rajib Mall TMH 6 th

3. Project Management and Tools & Technologies – An overview Shailesh Mehta SPD

4. Walker Royce, "Software Project Management – A Unified Framework", 2001, Pearson Education.

5. Roger S. Pressman, "Software Engineering", 2001, McGraw Hill.

6. S.A.Kelkar, "Software Project Management – A concise study", 2 nd Ed. PHI learning Pvt. Ltd. 2009

DSE-3B(1)

Course Code: CS-633 P **Course Title :** Practical based on C1.CS-631-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course C1. Software Project Management-II

Laboratory work will be based on the above syllabus C1.CS-631-T**. (Software Project Management-II)** with minimum 10 experiments to be incorporated.

DSE-3B(1)

Course code: CS-631 T **Course Title: D1. Big Data Analytics**

Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Prerequisites: Basic knowledge of 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 Analytical Theory and Methods: Classification, Decision Trees, Naïve Bayes, Diagnostics of Classifiers, Additional Classification Methods, Time Series Analysis, Box Jenkins methodology, ARIMA Model, Additional methods. Text Analysis, Steps, Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency-Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments.

Unit -2 Data Product, Building Data Products at Scale with Hadoop, Data Science Pipeline and Hadoop Ecosystem, Operating System for Big Data, Concepts, Hadoop Architecture, Working with Distributed file system, Working with Distributed Computation, Framework for Python and Hadoop Streaming, Hadoop Python, Streaming, MapReduce with Advanced MapReduce. In-Memory Computing with Spark, Spark Basics, Interactive Spark with PySpark, Writing Spark Applications

Unit -3 Distributed Analysis and Patterns, Computing with Keys, Design Patterns, Last-Mile Analytics, Data Mining and Warehousing,

Unit -4 Structured Data Queries with Hive, Hbase, Data Ingestion, Importing Relational data with Sqoop, Injesting stream data with flume. Analytics with higher level APIs, Pig, Spark's higher level APIs.

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.
7 Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
8 Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007

DSE-3B(1)

Course Code: CS-633 P **Course Title :** Practical based on D1.CS-631-T

Total Credit: 1.5 Marks: 50 (UA: 40 + IA: 10)

Periods: 3 per week (50 Minutes each)

Sample List of Experiments and Tutorials to be carried out based on the course D1. Big Data Analytics

Laboratory work will be based on the above syllabus D1.CS-631-T**. (Big Data Analytics)** with minimum 10 experiments to be incorporated.

DSE-3B(2)

Course code: CS-632 T **Course Title: Major Project**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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.

DSE-3B(2)

Course code: CS-634 P **Course Title: Seminar**

Total Credit: 1 Marks: 50 (UA: 40 + IA: 10)

Periods: 1 per week (50 Minutes each)

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.

SEC-4(G)

Course code: CS-641P **Course Title: Personality Development**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

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

SEC-4(H)

Course code: CS-641P T **Course Title: Digital Marketing**
Total Credit: 2 Marks: 50 (UA: 40 + IA: 10)
Periods: 3 per week (50 Minutes each)

Prerequisites

Fundamental knowledge of Marketing

Learning Objectives

To understand the basic Concepts of Digital marketing and the road map for successful Digital marketing strategies

Learning Outcomes

- Communicate clearly and effectively in both written, oral and digital forms.
- Students will demonstrate critical thinking
- Comprehension and Application of New Media
- Synthesis and the Foundational Knowledge of Business Disciplines

Course Outline

Unit -1 :
Fundamentals of Digital marketing & Its Significance, Traditional marketing Vs Digital Marketing, Evolution of Digital Marketing, Digital Marketing Landscape, Key Drivers, Digital Consumer & Communities, Gen Y & Netizen's expectation & influence WRT Digital Marketing.

Unit – 2:
The Digital users in India, Digital marketing Strategy- Consumer Decision journey, POEM Framework, Segmenting & Customizing messages, Digital advertising Market in India, Skills in Digital Marketing, Digital marketing Plan.

Unit – 3:
Terminology used in Digital Marketing, PPC and online marketing through social media, Social Media Marketing, SEO techniques, Keyword advertising, Google web-master and analytics overview, Affiliate Marketing, Email Marketing, Mobile Marketing

Unit – 4:
Display adverting, Buying Models, different type of ad tools, Display advertising terminology, types of display ads, different ad formats, Ad placement techniques, Important ad terminology, Programmatic Digital Advertising.

Unit – 5: Test and Tutorial

Reference Books:

1. Digital Marketing –Kamat and Kamat-Himalaya

2. Marketing Strategies for Engaging the Digital Generation, D. Ryan,

3. Digital Marketing, V. Ahuja, Oxford University Press

4. Digital Marketing, S.Gupta, McGraw-Hill

5. Quick win Digital Marketing, H. Annmarie , A. Joanna