

**Department of Computer Science and Engineering**  
**VII Semester B.E. (CSE)**  
**Scheme and Syllabus**

Sl.No	Subject Code	Subjects	Hrs/Week			C	CIE	SEE	Total
			L	T	P				
1.	UCS751C	Web Technologies	3	2	0	4	50	50	100
2.	UCS752C	Compiler Design	4	0	0	4	50	50	100
3.	UCS066E	Elective IV Internet of Things	3	0	0	3	50	50	100
	UCS072E	User Interface Design							
4.	UCS733N	Open Elective II Introduction to Data Science	3	0	0	3	50	50	100
	UCS731N	Cloud Computing and Applications:							
5.	UCS753L	Web Technologies Lab	0	0	2	1	50	50	100
6.	UCS754L	Computer Networks Lab	0	0	2	1	50	50	100
7.	UCS755P	Project Phase I	0	0	8	4	50	50	100
8.	UCS756I	Internship	0	0	-	2	50	50	100
			<b>13</b>	<b>2</b>	<b>12</b>	<b>22</b>	400	400	800

B.E (Computer Science and Engineering)			
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)			
SEMESTER -VII			
<b>Web Technologies</b>			
<b>Course Code</b>	<b>UCS751C</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L: T:P)</b>	<b>(3:2:0)</b>	<b>SEE Marks</b>	<b>50</b>
<b>Credits</b>	<b>04</b>	<b>Hours</b>	<b>52</b>
<b>Course Objectives</b>			
<ul style="list-style-type: none"> <li>• Have insight into World Wide, HTML/XHTML, Java Script, PHP.</li> <li>• Have proficiency in design of web applications which will work with database.</li> </ul>			
<b>Unit -1 (13 hours)</b>			
<p><b>Fundamentals:</b> A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, Security, The Web Programmer's Toolbox.</p> <p><b>Introduction to HTML/XHTML:</b> Origins and Evolution of HTML and XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists; Tables, Forms: The Audio Element, The Video Element, Organization Elements, The Time Element, Syntactic Differences between HTML and XHTML.</p> <p><b>Cascading Style Sheets:</b> Introduction, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color: The Box Model, Background Images, The span and div Tags, Conflict Resolution.</p>			
<b>Revised Bloom's Taxonomy Level</b>	<i>L<sub>1</sub> – Remembering, L<sub>2</sub> – Understanding, L<sub>3</sub> – Apply</i>		
<b>UNIT- II (13 hours)</b>			
<p><b>The Basics of java script:</b> Overview of java script, Object Orientation and java script, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control, Statements, Object Creation and Modification, Arrays, Functions, An Example, Constructors, Pattern Matching Using Regular Expressions, Another Example.</p> <p><b>JavaScript and HTML Documents:</b> The java script Execution Environment, The Document Object Model, Element Access in java script, Events and Event Handling. Handling Events from Body Elements, Handling Events from Button Elements Handling Events from Text Box and Password, Elements: The DOM 2 Event Model, The canvas Element, The navigator Object, DOM Tree Traversal and Modification.</p>			
<b>Revised Bloom's Taxonomy Level</b>	<i>L<sub>1</sub> – Remembering, L<sub>2</sub> – Understanding, L<sub>4</sub> – Analyze</i>		
<b>UNIT III (13 hours)</b>			

**Dynamic Documents with Java Script:** Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

**Introduction to j Query:**

Why j Query? Including jQuery, jQuery Syntax, A Simple Example, Avoiding Library Conflicts Selectors, Handling Events, Waiting Until the Document Is Ready, Event Functions and Properties, Special Effects, Manipulating the DOM, Dynamically Applying Classes, Modifying Dimensions, DOM Traversal, Using jQuery Without Selectors, Using Asynchronous Communication Plug-ins.

**Revised Bloom’s Taxonomy Level**

$L_1$  – Remembering,  $L_2$  – Understanding, L4-Analyze

**UNIT- IV (13 hours)**

**Introduction to XML:** Introduction, Uses of XML, The Syntax of XML,XMLDocument Structure, Namespaces, XML Schemas, Displaying Raw XML Documents, Displaying XML Documents with CSS,XSLT Style Sheets, XML Processors, Web Services.

**Introduction to PHP:** Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies, Session Tracking. **Database Access through the Web:** Database Access with PHP and MySQL.

**Revised Bloom’s Taxonomy Level**

$L_1$  – Remembering, L2-Understanding, L4-Analyse

**Course outcomes:**

At the end of the course the student will be able to:

- Explain the basics of World Wide Web
- Implement web concepts using different tools like HTML/XHTML/CSS/JavaScript/XML/XSLT/jQuery.
- Design web applications using client-side Java Scripts.
- Implement web applications using server –side PHP.
- Develop web application for real world problem.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
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**Textbooks**

1	Programming the World Wide Web	Robert W. Sebesta	Pearson Education	8th Edition, 2014
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**Reference Books**

1	Learning PHP, MySQL & JavaScript	Robin Nixon	O’Reilly Publications	5 <sup>th</sup> Edition, 2015
2	Internet & World Wide Web How to program	M. Deitel, P.J.Deitel, A. B. Goldberg	Pearson Education / PHI	3 <sup>rd</sup> Edition, 2004
3	Web Programming BuildingInternet Applications	Chris Bates	Wiley India	3rd Edition,2006

**Web links and Video Lectures:**

1. <http://www.w3schools.com>
2. <http://nptel.iitm.ac.in>.

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	PO 8	P O 9	P O 10	P O 11	P O 12	PSO1	PSO2	PSO3
No	<del>Programme Outcomes Course Outcomes</del>															
<b>The students will be able to:</b>																
1	Explain the basics of World Wide Web.	1												1		
2	Implement web concepts using different tools like HTML/XHTML/CSS/JavaScript/XML/XSLT/jQuery.		3	3		2								1		
3	Design web applications using client-side Java Scripts.		3	3		2								1		
4	Implement web applications using server –side PHP.		3	3		2								2		
5	Develop web application for real world problem		3	3		2								2	1	2

**B.E (COMPUTER SCIENCE AND ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER – VII**

**Compiler Design**

Course Code:	UCS752C	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	04	Hours	48

**Course objectives:**

- To understand the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.
- To provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.

**UNIT- I (12 hours)**

**Introduction, lexical analysis:** Language processors; The structure of a Compiler; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens. Lexical Analyzer generator

**Syntax analysis – 1:** Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing..

<b>Revised Bloom's Taxonomy Level</b>	<b>L<sub>1</sub></b> Remembering,	L3 –Applying L4-Analysis
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**UNIT- II (12 hours)**

**Syntax analysis – 2:** Bottom-up Parsing; Introduction to LR Parsing: Simple LR, Parser Generators.

**Syntax-directed translation:** Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes.

<b>Revised Bloom's Taxonomy Level</b>	<b>L<sub>1</sub></b> Remembering,	L3 –Applying L4-Analysis
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**UNIT- III (12 hours)**

**INTERMEDIATE CODE GENERATION:** Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Backpatching.

<b>Revised Bloom's Taxonomy Level</b>	<b>L<sub>1</sub></b> Remembering,	L3 –Applying L4-Analysis
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**UNIT- IV (12 hours)**

**RUN-TIME ENVIRONMENTS:** Storage Organization; Stack allocation of space, Access to non-local data on the stack; Heap management; **CODE GENERATION:** Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks. Simple Code Generator.

<b>Revised Bloom's Taxonomy Level</b>	<b>L<sub>1</sub></b> Remembering,	L3 –Applying L4-Analysis
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**Course outcomes:**

At the end of the course student should be able to

- Demonstrate the understanding of different phases of Compilation

- Express programming language tokens using regular expressions, and language constructs using Context free grammar.
- Construct Lexical Analyzer, parser/parsing tables and Syntax directed translation schemes for simple inputs
- Generate intermediate code for statements in high level language
- Apply optimization techniques to intermediate code and generate machine code for high level language program

SI No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	<b>Compilers- Principles, Techniques and Tools</b>	Alfred V Aho, Monica S. Lam,	2nd Edition, Addison-Wesley.	2007
<b>Reference Books</b>				
1	<b>Crafting a Compiler with C</b>	Charles N. Fischer, Richard J. leBlanc, Jr,	Pearson Education	1991
2	<b>Modern Compiler Implementation in C</b>	Andrew W Apple,	Cambridge University Press.	<b>1998</b>
3	<b>Compiler Construction Principles &amp; Practice</b>	Kenneth C Clouden	Thomson Education.	<b>1997</b>
4	<b>Lex &amp; Yacc</b>	John Levine, Doug Brown, Tony Mason	O'Reilly  Media2nd Edition	1992
<b>Web links and Video Lectures:</b>				
NPTEL course on Principles of Compiler Design :				
<a href="https://nptel.ac.in/courses/106/108/106108113/">https://nptel.ac.in/courses/106/108/106108113/</a>				

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

Compiler Design: UCS752C		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2	PSO 3
<b>No</b>	<b>Programme Outcomes Course Outcomes</b>															
<b>The students will be able to:</b>																
1	Demonstrate the understanding of different phases of Compilation	1	1											1		
2	Express programming language tokens using regular expressions, and language constructs using Context free grammar.	1	3	3										3		3
3	Construct Lexical Analyzer , parser/parsing tables and Syntax directed translation schemes for simple inputs		3	3									1	3		3
4	Generate intermediate code for statements in high level language		3	3									1	3		3
5	Apply optimization techniques to intermediate code and generate machine code for high level language program		3	3									1	3		3

<b>B.E (COMPUTER SCIENCE AND ENGINEERING)</b> <b>Outcome Based Education (OBE) and Choice Based Credit System (CBCS)</b> <b>SEMESTER – VII</b>			
<b>Elective</b> <b>Internet of Things</b>			
Course Code	UCS066E	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Hours	40
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• Students will be explored to the interconnection and integration of the physical world and the cyber space.</li> <li>• They are also able to design &amp; develop IOT Device.</li> </ul>			
UNIT - I (10 hours)			
What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding		
UNIT II (10 hours)			
IP as the IoT Network Layer, The Business Case for IP, the need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods. Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying		
UNIT- III (10 hours)			
Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - Raspberry: Introduction to Raspberry Pi, About the Raspberry Pi Board: Hardware Layout.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying		
UNIT- IV (10 hours)			
Operating Systems on Raspberry Pi, Configuring Raspberry Pi, Programming Raspberry Pi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to Raspberry Pi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart			



City Use-Case Examples	
Revised Bloom's Taxonomy Level	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying, L <sub>4</sub> -Analyzing

**Course outcomes:**

At the end of the course the student will be able to:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network
- Appraise the role of IoT protocols for efficient network Communication
- Elaborate the need for Data Analytics and Security in IoT.
- illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry and smart city project.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	<b>IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”,</b>	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,	Pearson Education (Cisco Press Indian Reprint). (ISBN:978-9386873743)	2020
	<b>Internet of Things</b>	Srinivasa K G	CENGAGE Learning India,	2017
<b>Reference Books</b>				
1	“Internet of Things (A Hands-on-Approach)”,	Vijay Madiseti and Arshdeep Bahga,		1 <sup>st</sup> Edition, VPT, 2014. ISBN:978-8173719547)
2	Internet of Things: Architecture and Design Principles	Raj Kamal	McGraw Hill Education,	1 <sup>st</sup> Edition, 2017. (ISBN: 978-9352605224)

Web links and Video Lectures:  
[https://youtube.com/channel/UC6ZY\\_csXZc7YZZm2W8HcQ6A](https://youtube.com/channel/UC6ZY_csXZc7YZZm2W8HcQ6A)

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

		P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
<b>No</b>	<b>Programme Outcomes Course Outcomes</b>															
<b>The students will be able to:</b>																
1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
2	Compare and contrast the deployment of smart objects and the technologies to connect them to network	-	2	3	2	-	-	-	-	-	-	-	-	1	-	-
3	Appraise the role of IoT protocols for efficient network Communication	-	2	2	-	-	-	-	-	-	-	-	-	1	-	-
4	Elaborate the need for Data Analytics and Security in IoT	1	2	3	-	-	-	-	-	-	-	-	-	1	-	-
5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry and smart city project	-	-	3	-	-	-	-	-	-	-	-	-	1	-	-

**B.E (COMPUTER SCIENCE AND ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**Elective Course**

**USER INTERFACE DESIGN**

Course Code	<b>UCS072E</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3-0-0)	SEE Marks	50
Credits	03	Hours	40

**Course Objectives:**

- To study the concept of menus, windows, interfaces
- To study about business functions
- To study the characteristics and components of windows and the various controls for the windows.
- To study about various problems in windows design with color, text, graphics
- To study the testing methods

<b>Bloom's Taxonomy Level</b>	L1- Remembering, Analyze,	,L3-Apply,L4-
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**UNIT I (10 Hrs)**

The User Interface-Introduction, Overview, the importance of user interface – Defining the user interface, The importance of good design, Characteristics of graphical and web user interfaces, Principles of user interface design

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-	,L3-Apply, L4-Analyze
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**UNIT- II (10 Hrs.)**

The User Interface Design process- Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business Functions-Business definition and requirement analysis, Basic business functions, Design standards.

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-	,L3-Apply, L4-Analyze
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**UNIT- III (10 Hrs.)**

System menus and navigation schemes- Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus.

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-	,L3-Apply, L4-Analyze
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**UNIT- IV (10 Hrs.)**

Windows - Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls. Screen based controls- Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests.

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-	,L3-Apply, L4-Analyze,
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Course Outcomes:

- Create Graphic Design artworks of your own.
- Explain the functionality of different design related software
- Use learned skills to solve problems of various layouts
- Test own’s skill and knowledge for a better workflow
- Select best output and what works for a particular given project

S   N	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>TEXT BOOKS:</b>				
1	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and	Wilbert O. Galitz	John Wiley & Sons	Third Edition, 2007.
<b>REFERENCE BOOKS:</b>				
1	Design the User Interface	Ben Sheiderman	Pearson Education	1998
2	The Essential of User Interface Design	Alan Cooper	Wiley-Dream Ltd., Tech	2002
<b>Web links and Video Lectures:</b> <a href="https://archive.nptel.ac.in/courses/124/107/124107008/">https://archive.nptel.ac.in/courses/124/107/124107008/</a>				

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

No	Programme Outcomes Course Outcomes	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Create Graphic Design artworks of your own	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
2	Explain the functionality of different design related software	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
3	Use learned skills to solve problems of various layouts	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-
4	Test own’s skill and knowledge for a better workflow	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-
5	Select best output and what works for a particular given project	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-

**B.E (Computer Science and Engineering)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER – VII**

**Introduction to Data Science**  
(Open elective - Common to all Branches)

Course Code:	<b>UCS733N</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Hours	40

**Course objectives:**

- Have insights into the basics of data science and its techniques.
- To develop proficiency in solving real world problems using data science techniques.

**Unit -1 (10 hours)**

**Chapter 1: Introduction**

Data Science. Applications of data science. Data science related to other field. Relationship between data science and Information science. Computational thinking. Skills for data science. Tools for data science. Issues of Ethics, Bias, and Privacy in Data Science.

**Chapter 2: Data**

Introduction. Data types: Structured Data, Unstructured Data, Challenges with Unstructured Data. Data Collections: Open Data, Social Media Data, Multimodal Data, Data Storage and Presentation. Data Pre-processing: Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization. Python/R coding examples

**Revised Bloom's Taxonomy Level**

L1-Remembering, L2-Understanding, L3 –Applying

**UNIT- II (10 hours)**

**Chapter 3: Techniques**

Introduction. Data Analysis and Data Analytics. Descriptive Analysis: Variables, frequency Distribution, Measures of Centrality, Dispersion of a Distribution. Python /R coding examples. Diagnostic Analytics: Correlations. Predictive Analytics. Prescriptive Analytics. Exploratory Analysis. Mechanistic Analysis: Regression. Python/R coding examples

**Chapter 4: Tools for data science**

R: Introduction. Getting Access to R. Getting Started with R: Basics, Control Structures, Functions, Importing Data. Graphics and Data Visualization: Installing ggplot2, Loading the Data, Plotting the Data. Statistics and Machine Learning: Basic Statistics, Regression, Classification, Clustering. Python/R coding examples. Sorting, Algorithms for Generating Combinatorial Objects.

**Revised Bloom's Taxonomy Level**

L1-Remembering, L2-Understanding, L3 –Applying  
L4-Analysis

**UNIT- III (12 hours)**

**Chapter 5: Machine learning for data science**

Machine Learning Introduction and Regression: Introduction, Machine Learning, Regression, Gradient Descent. Python/R coding examples.

**Chapter 6: Unsupervised learning**

Unsupervised Learning: Introduction, Agglomerative Clustering, Introduction to Reinforcement Learning. Python/R coding examples

**Revised Bloom's Taxonomy Level**

L1-Remembering, L2-Understanding, L3 –Applying  
L4-Analysis

**UNIT- IV (12 hours)**

**Chapter 7: Applications, Evaluations, and Methods**

Hands-On with Solving Data Problems: Introduction, Collecting and Analyzing Twitter Data, Collecting and Analyzing YouTube Data, Analyzing Yelp Reviews and Ratings. Python/R coding examples.

**Chapter 8: Data Collection, Experimentation, and Evaluation**

Introduction. Data Collection Methods: Surveys, Survey Question Types, Survey Audience, Survey Services, Analyzing Survey Data, Pros and Cons of Surveys, Interviews and Focus Groups, Why Do an Interview? Why Focus Groups? Interview or Focus Group Procedure, Analyzing Interview Data, Pros and Cons of Interviews and Focus Groups, Log and Diary Data, User Studies in Lab and Field. Picking Data Collection and Analysis Methods: Introduction to Quantitative Methods, Introduction to Qualitative Methods, Mixed Method Studies. Evaluation: Comparing Models, Training–Testing and A/B Testing, Cross-Validation.

**Revised Bloom’s Taxonomy Level**

L1-Remembering, L2-Understanding.L3 –Applying  
L4-Analysis

**Course outcomes:**

At the end of the course the student will be able to:

- Explain the fundamental concepts of data science.
- Apply appropriate data science technique for given dataset.
- Analyze the results to draw conclusion.
- Evaluate the performance of data analysis model designed for given dataset.
- Develop the data analysis model using machine learning technique to solve real world problem.

SI No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	A hands on introduction to Data Science	Chirag Shah	Cambridge, University Press	1 <sup>st</sup> Edition, 2020
<b>Reference Books</b>				
1	R for Data Science - Import, Tidy, Transform, Visualize, and Model Data	Hadley Wickham	O’Reilly Publications	2017
2	Introduction to Data Science	Laura Igual and Santi Segui	Springer International Publications	2017
3	Learning R	Richard Cotton	O’Reilly Publications	2013

**Web links and Video Lectures:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_cs69/](https://onlinecourses.nptel.ac.in/noc21_cs69/)
2. [https://onlinecourses.nptel.ac.in/noc21\\_ma35/preview](https://onlinecourses.nptel.ac.in/noc21_ma35/preview)



<b>B.E (COMPUTER SCIENCE AND ENGINEERING)</b> <b>Outcome Based Education (OBE) and Choice Based Credit System (CBCS)</b> <b>SEMESTER – VII</b>			
<b>Cloud Computing And Applications</b> (Open elective - Common to all Branches)			
Course Code	UCS003N	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Hours	40
<b>Brief description of the course:</b> Nowadays most of the applications run on the cloud platform. For e.g., Google app engine. Amazon Web Services and Microsoft Azure. There is a huge demand in current IT market for the beginners to build their career in this domain. Cloud computing offers many benefits to the trending technologies like big data analytics, IoT and automation. It finds applications in healthcare sector, Industry 4.0, automation, transportation, bioinformatics and in various fields.			
<b>Course objectives:</b> <ul style="list-style-type: none"> <li>• To have insight into cloud computing concepts, technologies, architecture and applications by introducing state-of-the-art in cloud computing.</li> <li>• To have proficiency in types of clouds and service models, cloud computing platform, scientific applications, business and consumer applications.</li> </ul>			
<b>UNIT - I (10 hours)</b>			
Introduction: Cloud Computing at a Glance, Characteristics of Cloud Computing, Cloud Service Models, Deployment Models, Advantages of Cloud. Cloud Computing Challenges.			
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding		
<b>UNIT II (10 hours)</b>			
Cloud Applications: Cloud Service Examples, Cloud-based Services and Applications. Moving Applications to the Cloud: Cloud Opportunities, Business opportunities using Cloud, Applications in the Cloud, Managing Desktop and Devices in Cloud, Cloud Desktop.			
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying		
<b>UNIT- III (10 hours)</b>			
Microsoft Cloud Services: Introduction, Windows Azure Platform. Google Cloud Applications: Google Applications Utilizing Cloud, Google App Engine. Amazon Cloud Services: Understanding Amazon Web Components and Services, Elastic Compute Cloud (EC2).			
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying		
<b>UNIT- IV (10 hours)</b>			
Cloud Applications: Scientific Applications: Healthcare: ECG Analysis in the Cloud, Gene-Expression Data Analysis for Cancer Diagnosis, Satellite Image Processing, Business and Consumer Applications: CRM and ERP, Cloud-based Solutions.			
<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> -Remembering, L <sub>2</sub> -Understanding, L <sub>3</sub> -Applying, L <sub>4</sub> -Analysing		



<b>Course outcomes:</b>				
At the end of the course the student will be able to:				
<ul style="list-style-type: none"> <li>Understand the definition of cloud computing, its advantages, characteristics, challenges and platforms.</li> <li>Describe cloud examples, opportunities, cloud-based services and applications etc.</li> <li>Describe and analyze various cloud computing platforms.</li> <li>Analyze scientific, business and consumer applications of cloud computing.</li> </ul>				
<b>Sl No</b>	<b>Title of the Book</b>	<b>Name of the Author/s</b>	<b>Name of the Publisher</b>	<b>Edition and Year</b>
<b>Textbooks</b>				
1	Mastering Cloud Computing	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi	McGraw Hill Education (India) Private Limited	1st Edition, 2017
<b>Reference Books</b>				
1	Cloud Computing	Barrie Sosinsky	Bible, Wiley India.	1st Edition, 2012
2	Cloud Computing	Kumar Saurabh	Wiley India	2nd Edition, 2014
<b>Web links and Video Lectures:</b>				
<a href="https://nptel.ac.in/courses/106/105/106105167">https://nptel.ac.in/courses/106/105/106105167</a> <a href="https://nptel.ac.in/courses/106/105/106105223">https://nptel.ac.in/courses/106/105/106105223</a> Cloud Computing Tutorial for Beginners: <a href="https://www.youtube.com/watch?v=RWgW-Cgdlk0">https://www.youtube.com/watch?v=RWgW-Cgdlk0</a> Cloud Computing Service Models: <a href="https://www.youtube.com/watch?v=n7B4icXvs74">https://www.youtube.com/watch?v=n7B4icXvs74</a> Introduction, Aneka Architecture, Hardware and Software Requirements, Building Aneka cloud: <a href="https://www.youtube.com/watch?v=WwAffgq4JZs">https://www.youtube.com/watch?v=WwAffgq4JZs</a>				

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>No</b>	<b>Programme Outcomes Course Outcomes</b>															
<b>The students will be able to:</b>																
1	Understand the definition of cloud computing, its advantages, characteristics, challenges and platforms.				1	2	2								1	2
2	Describe cloud examples, opportunities, cloud-based services and applications etc.				1	2		3	2	1		3			1	2
3	Describe and analyze various cloud computing platforms.			1	3	2	1	2	3				1	1	3	2
4	Analyze and demonstrate scientific, business and consumer applications of cloud computing.				2	3		2	1	3		1			2	3

**B.E (Computer Science and Engineering)**

**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**

**SEMESTER -VII**

**Web Technologies Laboratory**

<b>Course Code</b>	UCS753L	<b>CIE Marks</b>	50
<b>Teaching Hours/Week (L:T:P)</b>	(0:0:2)	<b>SEE Marks</b>	50
<b>Credits</b>	01	<b>Exam Hours</b>	03

**Course Objectives:**

At the end of the course the student will be able to:

- Use Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) for laying out (formatting) pages that contain text, images and graphics to design web pages.
- Write Extensible Markup Languages (XML is used to store and transport data among webpages)
- Write Client-side Programming using JavaScript for validating the data.
- Write Server-Side Programming using PHP.
- Creating a pure Dynamic Web Application which retrieves the data from Database according to the client request using JDBC.

**Assignment list**

1. Design and develop static web page using HTML to demonstrate tables, different forms of hypertext links and frames.
2. Design and develop web page to demonstrate CSS (Use different font styles, set background image for both the page and single elements on page, Control the repetition of image with background- repeat property, define style for links as a:link, a:active, a:hover,a:visited)
3. Develop web page to demonstrate Form validation using JavaScript.
4. Develop dynamic web page to demonstrate Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, reacting to a Mouse Click.
5. Program to demonstrate JQUERY.
6. Developments of XML files and write a DTD to validate the XML file and display the details in a table using XSLT.
7. PHP program to demonstrate Cookie creation, display and deletion.
8. PHP program to demonstrate session.
9. PHP program to perform CRUD operation on database.
10. PHP Program to validate the input data and store the acquired data to database. And also display the status of execution of operation.

**Course outcomes:**

At the end of the course the student will be able to:

<ul style="list-style-type: none"> <li>• Create and manage static web pages for given scenario</li> <li>• Design web applications using client-side Java Scripts.</li> <li>• Write XML/XSLT and jQuery programs.</li> <li>• Implement web applications using server –side PHP programming and database connectivity.</li> <li>• develop web applications with sessions.</li> </ul>				
SI No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	Programming the World Wide Web	Robert W. Sebesta	Pearson Education	8th Edition, 2014
<b>Reference Books</b>				
1	Learning PHP, MySQL & JavaScript	Robin Nixon	O'Reilly Publications	5 <sup>th</sup> Edition, 2015

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

Programme Outcomes Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
	<b>The students will be able to:</b>														
Create and Manage static web pages for given scenario	1	3	3		3								2	3	2
Design web applications using client-side Java Scripts	1	3	3		3								2	3	2
Write XML/XSLT and jQuery programs	1	3	3		3								2	3	2
Implement web applications using server –side PHP programming and database connectivity	1	3	3		3								2	3	2
Develop web applications with sessions	1	3	3		3								2	3	2

**B.E (Computer Science and Engineering)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER -VII**

**Computer Networks Laboratory**

<b>Course Code</b>	UCS754L	<b>CIE Marks</b>	50
<b>Teaching Hours/Week (L:T:P)</b>	(0:0:2)	<b>SEE Marks</b>	50
<b>Credits</b>	01	<b>Exam Hours</b>	03

**Course Objectives:**

At the end of the course the student will be able to:

- Simulate the network with different configurations to measure the performance parameters.
- Implement the data link, network layer and application layer protocols.
- Analyze routing algorithm to find the suitable path for transmission and control of flow rate.
- Enable communication between the peers using TCP/IP and UDP sockets.

**Assignment List**

**Part –A**

**Simulation Exercises**

**Introduction Part**

Introduce students to network simulation through the Network simulation Package, create a simple network model with multiple scenarios, Collect statistics on network performance through the use of simulator tools, Analyze and draw conclusion on network performance

1. Simulate four nodes' point-to-point network and study how the loss, utilization and transmission of wireless LAN (IEEE 802.11b) network varies as the distance between access point and wireless nodes.
2. Simulate point-to-point network which consists of 4 to 6 nodes and study network performance analysis of different scheduling technique like First In Out (FIFO), Priority, Round Robin, Weight Fair Queue (WFQ) using Net Sim.
3. Simulate and study the throughputs of slow start, Congestion avoidance (also known as Old Tahoe) and First Retransmit (also known as Tahoe), Congestion Control Algorithms during client-server TCP downloads.
4. Create a network topology which consists of six nodes, simulate and study the working and routing table formation of Interior Routing Protocol i.e. Routing Information Protocol (RIP) and Open Shortest Path First (OSPF).

## PART – B

### Implement the following in C/C++:

1. Write a program for error detecting code using CRC-CCITT (16 bit)
2. Write a program for hamming code generation for error detection and correction.
3. Write a program for distance vector algorithm to find suitable path for transmission.
4. Write a program for congestion control using leaky bucket algorithm.
5. Write a C program to develop a DNS client server to resolve the given hostname.
6. Write a client-server application for chat using UDP.
7. Using TCP / IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents to the requested file if present.
8. Write a program for simple RSA algorithm to encrypt and decrypt the data.

### Course outcomes:

At the end of the course the student will be able to:

- Simulate the network with different configurations to measure the performance parameters
- Implement the data link, network layer and application layer protocols.
- Analyze routing algorithm to find the suitable path for transmission and control of flow rate.
- Enable communication between the peers using TCP/IP and UDP sockets

### Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
No	Programme Outcomes Course Outcomes															
<b>The students will be able to:</b>																
1	Simulate the network with different configurations to measure the performance parameters.	3	3	3	3	2		2					2	1	2	1
2	Implement the data link, network layer and application layer protocols.	0	3	3	3	3	1	3					2	1	2	3
3	Analyze routing algorithm to find the suitable path for transmission and control of flow rate.	1	3	3	3	1	1	2					2	1	2	3
4	Enable communication between the peers using TCP/IP and UDP sockets.	0	3	3	2	3	1	2		2			2	1	3	2

**B.E (COMPUTER SCIENCE AND ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER – VII**

**Project Phase-I**

Course Code	<b>UCS755P</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:4)	SEE Marks	50
Credits	04	Exam Hours	3

**Course Objectives:**

- **To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same**
- **To train the students in preparing project reports and to face the reviews and viva-coce**
- **To work in teams and**

**Course Outcomes:At the end of the course student will be able**

- Review the current state of Art and trends in their area of interest and identify a suitable problem in their chosen subject domain with justification.
- Survey the available research literature/documents for the tools and techniques to be used.
- Examine the functional, non-functional, and performance requirements of their chosen problem definition.

**Procedure:**

- Students are informed to submit the synopsis, re-tune the synopsis and conduct literature survey/review to consolidate the idea and technical viabilities, in consultation with the project guide
- Students present the progress of the work periodically.
- The internal evaluation panel (consisting of Head, Project coordinator and Guide(s)) monitors the progress, checks the feasibility and evaluates as per the Project Rubrics R#A1.1 and suggests appropriate modifications if required.
- Student will go through two evaluations one at the mid-semester (as per Rubrics R#A1.2) and other towards the end of semester (as per Rubrics R#A1.3)
- The evaluation by the guide(s) is as per Rubrics R#A1.4
- Marks obtained as per Rubrics R#A1.1, R#A1.2, R#A1.3 and R#A1.4 are summed up to award marks obtained out of 50 marks as CIE marks
- The internal evaluation panel (consisting of Head, Project coordinator and Guide(s)) will evaluate Semester End Examination (SEE) for 50 marks using Rubrics R#A2

Apart from this, the guide continuously monitors the progress of the project

## Evaluation Criteria

Sl. No	Criteria	Marks
	<b>CIE 50 marks are divided as follows</b>	
1	Synopsis Presentation: <ul style="list-style-type: none"> <li>• Motivation for the project work (3)</li> <li>• Rationale behind the work (3)</li> <li>• Survey and problem identification (3)</li> <li>• Objectives (3)</li> <li>• Presentation (3)</li> </ul>	15
2	Guide Evaluation: <ul style="list-style-type: none"> <li>• Involvement in the work and ability to work in team (5)</li> <li>• Individual Contribution (5)</li> <li>• Peer/Guide interaction (5)</li> </ul>	15
3	Final Progress Review : <ul style="list-style-type: none"> <li>• Literature review (3)</li> <li>• Relevance to the present trend(2)</li> <li>• Feasibility analysis (2)</li> <li>• Proposed design methodology (5)</li> <li>• Preliminary/Conceptual Design work (4)</li> <li>• Presentation and report (4)</li> </ul>	20
	Total	50
<b>SEE evaluation criteria</b>		
4	Identification of Problem Domain and Detailed analysis of Feasibility	10
5	Objectives and Methodology of Project Proposal	10
6	Design Methodology	10
7	Planning of Project Work	10
8	Presentation	10
	Total	50
<b>Project will be evaluated by conducting CIE examination for 50 marks and SEE examination for 50 marks.</b>		

Revised Bloom's Taxonomy Level

**L<sub>1</sub> – Remembering, L<sub>2</sub> – Understanding, L<sub>3</sub> – Applying**

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

N o	Programme Outcomes Course Outcomes	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO	
		1	2	3	4	5	6	7	8	9	0	1	2	1	2	3	
<b>The students will be able to:</b>																	
1	Review the current state of Art and trends in their area of interest and identify a suitable problem in their chosen subject domain with justification	1	3			2	1	1	1	3	1	2	2	1	1	2	
2	Survey the available research literature/document for the tools and techniques to be used.		3			2	1	1	1	3	2	1	2	1	1	2	
3	Examine the functional, non-functional, and performance requirements of their chosen problem definition.		3			2	1	1	1	3	2	2	2	1	1	2	



**B.E (COMPUTER SCIENCE AND ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER – VII**

**Internship**

Course Code:	UCS756I	CIE Marks	50
Teaching Hours/Week (L:T:P)	--	SEE Marks	50
Credits	02	Hours	-

**Course objectives:**

This course will enable students to

- To enhance and/or expand the student's knowledge of a particular area(s) of software industry.
- To experience integration theory and practice and assess interests and abilities in their field of study.
- Develop work habits and attitudes necessary for job success and communication, interpersonal and other critical skills for their professional career.
- To build a record of work experience in their interested field of computer science and engineering.

**Internship:**

Students need to meet following criteria to successfully complete the internship course.

**1. Student's Diary/ Daily Log**

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated based on the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches, and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

**2. Internship Report**

The Internship report will be evaluated based on following criteria:

- Originality.
- Internship certificate from the industry.
- Adequacy and purposeful write-up.
- Organization, format, drawings, sketches, style, language etc.
- Variety and relevance of learning experience.
- Practical applications, relationships with basic theory and concepts taught in the course

**Course outcomes:**

At the end of the course the student will be able to:

- Demonstrate the knowledge gained during the internship at the industry.
- Exhibit abilities to use theoretical concepts in solving practical problems in their field of study.

- Demonstrate communication, interpersonal and other critical skills in their profession.

**Evaluation:**

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation through seminar presentation
3. Viva-voce at the Institute.

**Evaluation Through Seminar Presentation/Viva-Voce at The Institute**

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analysed along with the Internship Report

**Evaluation Criteria**

<b>Summary of Internship Evaluation (Industry Representative)</b>	
<b>Evaluation Criteria</b>	<b>Score from the above tables</b>
Quality of Work	10
Ability to Learn	10
Initiative and Creativity	10
Character Traits	10
Dependability	10
Organizational Fit	10
Response to Supervision	10
	<b>70</b>
<b>Internship Guide</b>	
Demonstration of experience	10
Report	10
Presentation	10
	<b>30</b>
<b>Total Score</b>	<b>100</b>

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

No	Course Outcomes	Programme Outcomes												PSO 1	PSO 2	PSO 3		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12					
<b>The students will be able to:</b>																		
1	Demonstrate the knowledge gained during the internship at the industry		2	2	2	2	2						2			2	1	1
2	Exhibit abilities to use theoretical concepts in solving practical problems in their field of study		2	2	2	2	2						2			2	1	1
3	Demonstrate communication, interpersonal and other critical skills in their profession		1	1	1	1	1						3			1		1

**VIII Semester B.E. (CSE)**  
**Scheme and Syllabus**

Sl.No	Subject Code	Subjects	Hrs/Week			C	CIE	SEE	Total
			L	T	P				
1.	UCS039E	Elective V Software Testing	3	0	0	3	50	50	100
2.	UCS062E	Elective VI Cloud Computing	3	0	0	3	50	50	100
3.	UCS070E	Elective VII Block Chain Technology	3	0	0	3	50	50	100
4.	UCS851S	Seminar	0	0	2	1	50	50	100
5.	UCS853P	Project Phase II	0	0	22	11	50	50	100
			<b>9</b>	<b>0</b>	<b>24</b>	<b>21</b>	250	250	500

**B.E (COMPUTER SCIENCE AND ENGINEERING)  
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)  
SEMESTER – VIII**

**SOFTWARE TESTING**

Course Code:	UCS039E	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Hours	40

**Course objectives: Analyze the asymptotic performance of algorithms.**

- Have insight into the basics of various algorithmic design techniques.
- To develop proficiency in algorithmic approaches of Brute Force, Divide and Conquer, Decrease and conquer, Greedy and Dynamic programming.

**UNIT -I (10 hours)**

**BASICS OF SOFTWARE TESTING:** Human Errors and Testing; Software Quality: Quality attributes, Reliability. Requirements, Behaviour and Correctness; Correctness versus Reliability. Testing and Debugging; Test Metrics; Software and Hardware Testing: Testing and Verification Defect Management; Execution History; Test generation Strategies, Static Testing: Walkthroughs, inspections, use of static code analysis tools in static testing. Model-Based Testing and Model Checking Control-Flow Graph; Examples for Control Flow Graph, Types of Testing;

<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> –Remembering, L <sub>2</sub> – <b>Understanding</b> , L <sub>3</sub> –Applying L <sub>4</sub> -Analysis
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**UNIT- II (10 hours)**

**TEST GENERATION FROM REQUIREMENTS – 1:** The Test-Selection Problem; Equivalence Partitioning; Fault Targeted, relations and equivalence partitioning. Solving Unidimensional versus multidimensional partitioning, Examples on Equivalence partitioning method Boundary Value Analysis; Solving Examples on Boundary Value Analysis Category-Partition Method: Solving Examples on Category-Partition Method. Cause-Effect Graphing: Solving Examples on Cause-Effect Graphing Test Generation from Predicates: Predicates and Boolean expressions, Fault model for predicate testing. Predicate constraint, predicate testing criteria, Generating BOR, BRO and BRE-adequate tests. . Cause effect graphs and predicate testing, Fault Propagation.

<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> –Remembering, L <sub>2</sub> – <b>Understanding</b> , L <sub>3</sub> –Applying L <sub>4</sub> -Analysis
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**UNIT- III (12 hours)**

**STRUCTURAL TESTING:**

Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem. **DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING:** Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter-procedural analysis; DATA FLOW TESTING: Overview of data flow testing; Data flow coverage with complex structures; The infeasibility problem. Examples.

**TEST CASE SELECTION AND ADEQUACY, TEST EXECUTION:** Overview; Test specification and cases; Adequacy criteria; Comparing criteria. **TEST CASE SELECTION AND ADEQUACY, TEST EXECUTION:** Overview; Test specification and cases; Adequacy criteria; Comparing criteria; Overview of test execution; From test case specification to test cases; Scaffolding; Generic versus specific scaffolding; Test oracles; Self-checks as oracles; Capture and replay

<b>Revised Bloom's Taxonomy Level</b>	L <sub>1</sub> –Remembering, L <sub>2</sub> – <b>Understanding</b> , L <sub>3</sub> –Applying L <sub>4</sub> -Analysis
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**UNIT- IV (10 hours)**

**PROCESS: Test** and analysis activities within a software process: The quality process; Planning and monitoring; Quality goals; **Dependability properties;** Analysis; Testing; Improving the process; Organizational factors. Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies.

Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques.

<b>Revised Bloom's Taxonomy Level</b>	<b>L<sub>1</sub> —Remembering, L<sub>2</sub> — Understanding, L<sub>3</sub> —Applying L<sub>4</sub>-Analysis</b>
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**Course outcomes:**

At the end of the course the student will be able to:

- CO1: Become familiar the importance of software quality/software testing and apply software testing techniques for information systems development.
- CO2: Generate test cases from software requirements using various test processes for continuous quality improvement.
- CO3: Apply software testing techniques in commercial environments and assess the adequacy of test suites using control flow, data flow, and program mutation.
- CO4: Develop the abilities to identify the inputs and deliverables of the testing process and work together as a team in preparing a report.
- CO5: Use industry-standard testing tools for real time applications.

SI No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	Foundations of Software Testing	Aditya P Mathur	Pearson Education.	2008.
2	Software Testing and Analysis – Process, Principles and Techniques,	Mauro Pezze, Michal Young	Wiley India,	2009.

**Web links and Video Lectures:**

1. [https://onlinecourses.nptel.ac.in/noc22\\_cs61/preview](https://onlinecourses.nptel.ac.in/noc22_cs61/preview)

**Course articulation matrix for UCS039E: Software Testing VIII Semester B. E. (CSE)**

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	1					1			2		2	
CO2	1	3	2	3					1	1		2		3	
CO3	1	3	3	2					1			2	1	2	
CO4	1	2	3	2					1			2	1	2	
CO5	2	3	3	3					1	1	1	2	2	1	

<b>B.E (COMPUTER SCIENCE AND ENGINEERING)</b> <b>Outcome Based Education (OBE) and Choice Based Credit System (CBCS)</b> <b>SEMESTER – VIII</b> <b>Elective</b>			
<b>Cloud Computing</b>			
Course Code	<b>UCS062E</b>	CIE Marks	40
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Hours	40
<b>Course objectives:</b> <ul style="list-style-type: none"> <li>• To have insight into cloud computing concepts, technologies, architecture, and applications by introducing state-of-the-art in cloud computing.</li> <li>• To have proficiency in types of clouds and service models, Aneka platform, virtualization technology, high through put and data intensive computing.</li> </ul>			
<b>UNIT I (10 hours)</b>			
Introduction: Cloud Computing at a Glance, Historical Development, Characteristics of Cloud Computing, Building Cloud Computing Environments, Computing Platforms and Technologies. Cloud Computing Architecture: Introduction, Cloud Reference Model, Types of Clouds, Economics of Cloud, Open Challenges.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding		
<b>UNIT II (10 hours)</b>			
Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Computing and Management. Concurrent Computing: Thread Programming: Introducing Parallelism for Single Machine Computation, Programming Application with Threads, Multi Applications with Threads, Multithreading with Aneka, <del>Programming Applications with Aneka Threads.</del>			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying, L <sub>4</sub> – Analysing		
<b>UNIT III (10 hours)</b>			
Virtualization: Introduction and Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples. Cloud Applications: Scientific Applications, Business and Consumer Applications.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying, L <sub>4</sub> – Analysing		
<b>UNIT IV (10 hours)</b>			
High Through put Computing: Task Programming: Task Computing, Task-based Application Models, Aneka Task-Based Programming. Data Intensive Computing: Map- Reduce Programming: What is Data-Intensive Computing? Technologies for Data-Intensive Computing, Aneka Map Reduce Programming.			
<b>Revised Bloom’s Taxonomy Level</b>	L <sub>1</sub> – Remembering, L <sub>2</sub> – Understanding, L <sub>3</sub> – Applying		

**Course outcomes:**

At the end of the course the student will be able to:

- Identify the working nature of Cloud Computing technology and modules involved in it.
- Illustrate the representation of knowledge and inference using different cloud computing platforms
- Explore the Aneka Cloud Computing platform and its threading programming
- Apply and analyze the knowledge of virtualization, different types of computing methods in various computing technology.
- Demonstrate or evaluate the knowledge of cloud computing platforms and its applications

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	Mastering Cloud Computing	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi	McGraw Hill Education (India) Private Limited	1st Edition, 2013
<b>Reference Books</b>				
1	Cloud Computing	Barrie Sosinsky	Bible, Wiley India.	1st Edition, 2010
2	Cloud Computing	Kumar Saurabh	Wiley India	2nd Edition, 2012

**Web links and Video Lectures:**

1. <https://nptel.ac.in/courses/106/105/106105167>
2. <https://nptel.ac.in/courses/106/105/106105223>
3. Cloud Computing Tutorial for Beginners: <https://www.youtube.com/watch?v=RWgW-Cgdlk0>
4. Cloud Computing Service Models: <https://www.youtube.com/watch?v=n7B4icXvs74>
5. Introduction, Aneka Architecture, Hardware and Software Requirements, Building Aneka cloud: <https://www.youtube.com/watch?v=WWAffgq4JZs>



**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Outcomes**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>No</b>	<b>Programme Outcomes Course Outcomes</b>															
<b>The students will be able to:</b>																
1	Identify the working nature of Cloud Computing technology and modules involved in it.				1	2	2								1	2
2	Illustrate the representation of knowledge and inference using different cloud computing platforms available in the IT market.				1	2		3	2	1		3			1	2
3	Explore the Aneka Cloud Computing platform and its threading programming			1	3	2	1	2	3				1	1	3	2
4	Apply and analyze the knowledge of virtualization, different types of computing methods in various computing technology.				2	3		2	1	3		1			2	3
5	Demonstrate or evaluate the knowledge of cloud computing platforms and its applications.				3	2	1	3	2	2					3	2

**B.E (SCIENCE AND COMPUTER ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**Elective**

**Block Chain Technology**

<b>Course Code</b>	UCS070E	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>(3:0:0)</b>	<b>SEE Marks</b>	<b>50</b>
<b>Credits</b>	<b>03</b>	<b>Hours</b>	<b>40</b>

**Course objectives:**

- Have insight into Block Chain Technology.
- Have proficiency in design of applications using Block Chain Technology.

**Unit -1 (10 hours)**

Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain: various technical def of block chain, Generic Elements, Features, Applications,,  
Types of blockchain: Public, Private, Semi-private, Side chain, Permissioned ledger, Distributed ledger, Shared, Fully private and proprietary block chains, Tokenized and tokenless block chains, Consensus block chains, CAP theorem and blockchain, Benefits and limitations of blockchain.

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-Understanding, L3-Apply, L4-Analyze
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**UNIT II (10 hours)**

Decentralization and Cryptography:  
Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Blockchain and full ecosystem decentralization, Smart contract, Decentralized organizations.  
Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography,

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-Understanding, L3-Apply, L4-Analyze, L5-Evaluate
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**UNIT III (10 hours)**

Bitcoin and Alternative Coins  
A: Bitcoin, Transactions life cycle, structure, types of transaction, Blockchain: structure of block and header, Genesis block, bitcoin network, Wallets, Bitcoin payments: investment and buying and selling bitcoins, Bitcoin installation, Bitcoin programming and command line interface, BIPS  
B: Alternative Coins  
Theoretical foundations: proof of work, Difficulty adjustment and retargeting algorithms, Bitcoin limitations,

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-Understanding, L3-Apply, L4-Analyze, L5-Evaluate
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**UNIT IV (12 hours)**

Smart Contracts and Ethereum 101:  
Smart Contracts: Definition, Ricardian contracts: Smart contract templates, oracles, Smart oracles, Deploying smart contracts on a blockchain.  
Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum Block chain, Precompiled contracts.

<b>Revised Bloom's Taxonomy Level</b>	L1- Remembering, L2-Understanding, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create
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**Course Outcomes:**

At the end of the course, students are able to:

- Define and Explain the fundamentals of Block chain technology.
- Illustrate the technologies of block chain.
- Describe the models of block chain Technology.
- Demonstrate the Block chain Technology using Ethereum.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbooks</b>				
1	“Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained	Imran Bashir	Packt Publishing Ltd,	2nd Edition, ISBN 978-1-78712-544-5, 2017
<b>Reference Books</b>				
1.	Bitcoin and Cryptocurrency Technologies	Arvind Narayanan, Joseph Bonneau, , Edward Felten,		2016
2.	Blockchain Basics: A Non-Technical Introduction in 25 Steps,	Daniel Drescher,	Apress,	First Edition, 2017
3.	Mastering Bitcoin: Unlocking Digital Crypto currencies	Andreas M. Antonopoulos	O'Reilly Media,	First Edition, 2014
<b>Web links and Video Lecture:</b>				
<ol style="list-style-type: none"> <li><a href="https://nptel.ac.in/https://onlinecourses.nptel.ac.in/noc20_cs01/preview">Introduction to Blockchain Technology and Applications - Course (nptel.ac.in)https://onlinecourses.nptel.ac.in/noc20_cs01/preview</a></li> <li><a href="https://onlinecourses.nptel.ac.in/noc19_cs63/preview">Blockchain Architecture Design and Use Cases - Course (nptel.ac.in) https://onlinecourses.nptel.ac.in/noc19_cs63/preview</a></li> <li><a href="https://nptel.ac.in/courses/106104220">https://nptel.ac.in/courses/106104220</a></li> </ol>				

### Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

<i>Computer Organization:UCS315C</i>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>No</b>	<b>Programme Outcomes Course Outcomes</b>															
<b>The students will be able to:</b>																
1	Define and Explain the fundamentals of Block chain technology.	1		2		2							3	2	1	
2	Illustrate the technologies of block chain.	2		3		1						2	2		2	
3	Describe the models of block chain Technology.				2	1	1						1	2		1
4	Demonstrate the Block chain Technology using Ethereum	1	1	1		2						2	3	1	1	

**B.E (COMPUTER SCIENCE AND ENGINEERING)**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**  
**SEMESTER – VIII**

**Seminar**

Course Code	<b>UCS851S</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Hours	--

**Seminar:**

Seminars are used as course delivery modes to encourage students to gather current trends in technology, research literature, and self-learn topics of their interest. Seminars require students to research a technical topic, make presentations and write a detailed document on their findings individually under the guidance of faculty.

**Course outcomes (COs):**

The student is expected to:

- Identify seminar topics based on contemporary technical, societal, and environmental issues.
- Conduct literature survey on complex issues in the selected domain
- Explore advanced technologies
- Make good oral and written technical presentations

**Course objectives:**

Sl. No	Criteria	Marks
1	Understand problems and select Topic from journal/transaction papers from ACM/ Elsevier/Springer/ IEEE etc..	3
2	Societal/ environmental/ Ethical relevance of the topic	2
3	Ability to collect required number of back ground materials	3
4	Ability to select papers with latest technical knowledge and tools	3
5	Preparation of slides	5
6	Presentation	15
7	Knowledge on the topic	4
8	Report	15
	<b>Total</b>	<b>50</b>

Seminar will be evaluated by conducting CIE examination for 50 marks and SEE examination for 50 marks.

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

No	Programme Outcomes Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>The students will be able to:</b>																
1	Identify seminar topics based on contemporary technical, societal, and environmental issues.		2		3	3	2		2					1	1	1
2	Conduct literature survey on complex issues in the selected domain											2	2	1	1	
3	Explore advanced technologies		2		3									1	1	
4	Make good oral and written technical presentations									2		3	3	1	1	1

**B.E (COMPUTER SCIENCE AND ENGINEERING)  
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER  
– VIII**

**Project Phase-II**

Course Code	<b>UCS853P</b>	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:22)	SEE Marks	50
Credits	11	Exam Hours	3

**Course Objectives:**

- **To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same**
- **To train the students in preparing project reports and to face the reviews and viva-coce**
- **To work in teams**

**Course Outcomes: At the end of the course students will be able to**

- Design system architecture and different components and develop all the system components using appropriate tools and techniques.
- Work effectively in a team and use good project management practices.
- Defend the project work carried out in teams orally and in writing.

**Procedure:**

- Students are monitored to carry the project as per the time table displayed at the beginning of the semester.
- The progress of project work is monitored by the panel of internal faculty and three evaluations are to be carried out using Rubrics R#B1.1, R#B1.2 and R#B1.3
- The evaluation by the guide is as per Rubrics R#B1.4 and the project report evaluation is as per Rubrics R#B1.5
- Marks obtained as per Rubrics R#B1.1, R#B1.2, R#B1.3, R#B1.4 and R#B1.5 are summed up to award marks obtained out of 50 marks as CIE marks
- A panel consisting of Head, project coordinator and an external examiner evaluates and awards the SEE marks as per the Rubrics R#B2.

<b>Revised Bloom's Taxonomy Level</b>	, L-4
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Sl. No	Criteria	Marks
<b>CIE Evaluation criteria</b>		
<b>1</b>	Review #1: <ul style="list-style-type: none"> <li>• Design methodology and planning of project work</li> <li>• Demonstration and presentation</li> </ul>	10
<b>2</b>	Review #2: <ul style="list-style-type: none"> <li>• Incorporation of Suggestions made in the previous review</li> <li>• Demonstration and Presentation</li> </ul>	10
<b>3</b>	Review #3: <ul style="list-style-type: none"> <li>• Incorporation of Suggestions made in the previous review</li> <li>• Demonstration and Presentation</li> </ul>	10

4	Evaluation by the guide: <ul style="list-style-type: none"> <li>• Technical Knowledge and Awareness related to the Project</li> <li>• Regularity and Attendance</li> </ul>	10
5	Report Evaluation: <ul style="list-style-type: none"> <li>• Organization and structure of Project Report</li> <li>• Description of Concepts and Technical Details, Conclusion and Discussion</li> </ul>	10
	<b>Total</b>	50
<b>SEE Evaluation Criteria</b>		
6	Presentation	10
7	Designs and implementation	10
8	Results and Demonstration	10
9	Project report	10
10	Viva - Voce	10
	<b>Total</b>	50

**Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)**

No	Programme Outcomes Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>The students will be able to:</b>																
1	Design system architecture and different components and develop all the system components using appropriate tools and techniques	1	2	3	2	3	1	1	1	3	1	2	2	3	2	2
2	Work effectively in a team and use good project management practices.		2	1	2				2	3	2	1	2			
3	Defend the project work carried out in teams orally and in writing.					2			2	3	3	1	2			