K.S. RANGASAMY COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)

TIRUCHENGODE – 637 215

BACHELOR OF SCIENCE (COMPUTER SCIENCE - DATA SCIENCE)

Scheme and Syllabus (2020 – 2021)

BACHELOR OF SCIENCE (COMPUTER SCIENCE - DATA SCIENCE)

VISION

To provide quality education in the field of Computer Science with the specialization of Data Science to meet up the needs of the industries and society by producing dedicated professionals.

MISSION

- To provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit and ethical responsibilities.
- To equip the graduates with the necessary skills in statistical data analysis and to understand the computing for data science.
- To inculcate the latest tools and technologies for software development to cope with current industrial needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: To solve wide range of real time problems in computing by effectively applying tools and techniques in order to cater the needs of industry and society.

PEO2: To inculcate the multidisciplinary approach, professional attitude and communication skills, to become effective associates through innovative methodologies, will be able to deal with the social, technical and business challenges.

PEO3: To be a good team member and in course of time will be able to lead the team to find solutions and enhancements in their field of proficiency.

PROGRAMME OUTCOMES (PO)

After completion of the programme, the graduates will be able to

PO1: Apply logical, programming and software development skills in various domains.

PO2: Apply the knowledge of Statistical concept for Data Analytics using latest tools.

PO3: Identify and formulate the Machine Learning techniques over Big Data.

PO4: Exhibit the acquired skills in different domains such as .NET framework, Python and R tools.

PO5: Apply the effective skills in Project Management, Risk and Change Management with professional and ethical responsibilities.

PROGRAMME SPECIFIC OUTCOMES (PSO)

After completion of the programme, the graduates will be able to

PSO1: Define the optimize solution for the given problem with effective programming development skills.

PSO2: Apply the different statistical strategies in Data Analytics to acquire exact results.

PSO3: Implement various Machine Learning Algorithms to make predictions or decisions over very high volume data sets.

PSO4: Use knowledge for the development of real time applications with innovative ideas and emerging technologies.

PSO5: Understand and formulate professional, ethical, legal, security and social issues and responsibilities for the computing profession.

REGULATIONS

ELIGIBILITY

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Statistics (Academic stream or Vocational stream) as one of the subject under Higher Secondary Board of Examination, TamilNadu as per norms set by the Government of TamilNadu or an Examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Science in Computer Science - Data Science** degree examination of this university after a course of study of three academic years.

DURATION OF THE PROGRAMME

The programme shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective courses.

MAXIMUM DURATION FOR THE COMPLETION OF THE UG PROGRAMME

The maximum duration for completion of the UG Programme shall not exceed 12 semesters.

SCHEME OF EXAMINATION

Subject Code	Subject	Hrs. of Instruction	Exam Duration (Hrs)	Max Marks			Credits
				CA	CE	Total	
First Semester							
Part I							
18UTALA101/ 18UHILA101/ 18UFRLA101	Tamil-I/ Hindi-I/ French-I	5	3	25	75	100	3
Part II							
18UENLA101	Foundation English I	5	3	25	75	100	3
Part III							
20UDSM101	Core I: Programming in C	5	3	25	75	100	4
20UDSM102	Core II: Introduction to Data Science	4	3	25	75	100	3
20UMADSA101	Allied I: Discrete Mathematics	5	3	25	75	100	4
20UDSMP101	Core Practical I: Programming in C	2	3	40	60	100	2
20UDSMP102	Core Practical II: Data Analysis in Excel	2	3	40	60	100	2
Part IV							
18UVE101	Value Education I: Yoga	2	3	25	75	100	2
		30				**800**	**23**
Second Semester							
Part I							
18UTALA201/ 18UHILA201/ 18UFRLA201	Tamil-II/ Hindi-II/ French-II	5	3	25	75	100	3
Part II							
18UENLA201	Foundation English II	5	3	25	75	100	3
Part III							
20UDSM201	Core III: Object Oriented Programming with C++	5	3	25	75	100	4

20UDSM202	Core IV: Data Structures	5	3	25	75	100	3
20UMADSA201	Allied II: Statistics I	5	3	25	75	100	4
20UDSMP201	Core Practical III: Programming in C++	3	3	40	60	100	2
Part IV							
18UVE201	Value Education II: Environmental Studies	2	3	25	75	100	2
		30				**700**	**21**
Third Semester							
Part I							
18UTALA301/ 18UHILA301/ 18UFRLA301	Tamil-III/ Hindi-III/ French-III	5	3	25	75	100	3
Part II							
18UENLA301	Foundation English III	5	3	25	75	100	3
Part III							
20UDSM301	Core V: Programming in Java	4	3	25	75	100	4
20UDSM302	Core VI: Big Data Analytics	4	3	25	75	100	3
20UMADSA301	Allied III: Statistics II	4	3	25	75	100	4
20UDSMP301	Core Practical IV: Programming in Java	2	3	40	60	100	2
Part IV							
20UDSSBP301	SBC Practical I:Web Designing using HTML, CSS (Internal Evaluation)	2	3	100	-	100	2
	NMEC I	2	3	25	75	100	2
Non Credit							
18ULS301	Career Competency Skills I	1	-	-	-	-	-
	Add-On Course I	**1**	3	40	60	100	-
		30				**900**	**23**

Fourth Semester							
Part I							
18UTALA401/ 18UHILA401/ 18UFRLA401	Tamil-IV/ Hindi-IV/ French-IV	5	3	25	75	100	3
Part II							
18UENLA401	Foundation English IV	5	3	25	75	100	3
Part III							
20UDSM401	Core VII: Programming in .NET (VB.NET &ASP.NET)	4	3	25	75	100	4
20UDSM402	Core VIII: Relational Database Management Systems	4	3	25	75	100	3
20UMADSA401	Allied IV: Operations Research	4	3	25	75	100	4
20UDSMP401	Core Practical V: Programming in .NET	2	3	40	60	100	2
Part IV							
20UDSSBP401	SBC Practical II: JavaScript(Internal Evaluation)	2	3	100	-	100	2
	NMEC II	2	3	25	75	100	2
Non Credit							
18ULS401	Career Competency Skills II	1	-	-	-	-	-
	Add-On Course II	1	3	40	60	100	-
		30				**900**	**23**

Fifth Semester							
Part III							
20UDSM501	Core IX: Data Mining and Warehousing	6	3	25	75	100	5
20UDSM502	Core X: Software Engineering	5	3	25	75	100	5
20UDSM503	Core XI: Operating Systems	5	3	25	75	100	4
	Elective : I	5	3	25	75	100	4
20UDSMP501	Core Practical VI: R Programming	3	3	40	60	100	2
20UDSMP502	Core Practical VII: Computer Hardware	3	3	40	60	100	2
Part IV							
20UDSSBP501	SBC Practical III: MySQL(Internal Evaluation)	2	3	100	-	100	2
Part V							
20UDSE501	Extension Activity	-	-	-	-	-	2
Non Credit							
18ULS501	Career Competency Skills III	1	-	-	-	-	-
		30				**700**	**26**
Sixth Semester							
Part III							
20UDSM601	Core XII: Python Programming	6	3	25	75	100	5
20UDSM602	Core XIII: Computer Networks [Fifth Unit as Self- study]	6	3	25	75	100	4
	Elective II	6	3	25	75	100	4
20UDSMP601	Core Practical VIII: Python Programming	3	3	40	60	100	2
20UDSMP602	Core Practical IX: Computer Networking	3	3	40	60	100	2
20UDSPR601	Project Work	3	3	40	60	100	5

Part IV							
20UDSSBP601	SBC Practical IV: PHP(Internal Evaluation)	2	3	100	-	100	2
Non Credit							
18ULS601	Career Competency Skills IV	1	**-**	**-**	**-**	**-**	**-**
		30				**700**	**24**
					Grand Total	**4700**	**140**

ADD-ON COURSE

The department offers the following two subjects as ADD-ON Course in third and fourth semester.

S.No.	Semester	Subject Code	Subject
1	III	20UDSAC301	SCILAB
2	IV	20UDSAC401	SPSS

ADVANCED LEARNER COURSE

The department offers the following two subjects as Advanced Learners Course in fourth and fifth semesters.

S.No.	Semester	Subject Code	Subject
1	IV	20UDSAL401	Information Security
2	V	20UDSAL501	Cyber Security
3	**Online Certification Courses**		

NON MAJOR ELECTIVE COURSE

The department offers the following two subjects as Non Major Elective Course for other than the computer science – data science students for third and fourth semesters.

S.No.	Semester	Subject Code	Subject
1	III	20UDSNM301	Internet Technology
2	IV	20UDSNM401	Principles of Web Design

ELECTIVE I

(Student shall select any one of the following subject as Elective in fifth semester)

S.No	Subject Code	Subject
1.	20UDSEL501	Social Media Mining
2.	20UDSEL502	Natural Language Processing

ELECTIVE II

(Student shall select any one of the following subject as Elective in sixth semester)

S.No	Subject Code	Subject
1.	20UDSEL601	Artificial Intelligence and Expert Systems
2.	20UDSEL602	Information Retrieval Techniques

FOR COURSE COMPLETION

Student shall complete:

- Language subjects (Tamil/Hindi/French, English) in I, II, III and IV semester.
- All Major papers.
- Value Education: Yoga and Environmental Studies in I and II semester respectively.
- Allied subjects in I, II, III and IV semester.
- Skill Based Course in III, IV, V and VI semester.
- Non-Major Elective Course in III and IV semester.
- Career Competency Skills in III, IV, V and VI semester.
- Add-on Course in III and IV semester.
- Advanced Learners Course in IV and V semester.
- Extension activity in V semester.
- Elective subjects in V and VI semesters.
- An In-House project and viva-voce in VI semester.

TOTAL CREDITS DISTRIBUTION

Components	Subjects	No. of Subjects x Marks	Total	Credits x Papers	Credits
Part - I	Tamil	4 x 100 =	400	3 x 4 papers	12
Part – II	Foundation English	4 x 100 =	400	3 x 4 papers	12
Part - III	Core	13 x 100 =	1300	5 x 3 papers	15
				4 x 6 papers	24
				3 x 4 papers	12
	Project	1 x 100 =	100	5 x 1 paper	05
	Core Practical	9 x 100 =	900	2 x 9 papers	18
	Elective	2 x 100 =	200	4 x 2 papers	08
	Allied	4 x 100 =	400	4 x 4 papers	16
Part - IV	VE (Yoga, EVS)	2 x 100 =	200	2 x 2 papers	04
	SBC	4 x 100 =	400	2 x 4 papers	08
	NMEC	2 x 100 =	200	2 x 2 papers	04
Part - V	Extension Activity	-	-	2 x 1 activity	02
Total		**45 x 100 =**	**4500**		**140**

18UTALA101	TAMIL – I: கவிதைகளும் கதைகளும்	பருவம் - I

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- தற்காலத்தமிழ் இலக்கியவகைகளைமாணவர்களுக்குக் கற்பித்தல்.
- காலந்தோறும் தமிழ்க் கவிதைவளர்ச்சிநிலைகளைஅறிமுகப்படுத்துதல்.
- அடிப்படைத் தமிழ் இலக்கணத்தைக் கற்பித்துஅரசுப்போட்டித் தேர்வுகளுக்கு ஆயத்தப்படுத்துதல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	மரபுக் கவிதைகள் அ.பாரதியார் - பாரததேசம் ஆ.பாரதிதாசன் - தமிழின் இனிமை இ. நாமக்கல் கவிஞர் - கவிதைஎன்றால் என்ன? ஈ. முடியரசன் - நல்லஉலகமடா!	10	CO1
II	புதுக்கவிதைகள் அ.வைரமுத்து - ரத்ததானம் - தண்ணீர் பிச்சை ஆ.வெ.இறையன்பு - பூபாளத்திற்கொருபுல்லாங்குழல் - பனித்துளியில் பாற்கடல் இ. தீபா - மழைக்குஒருமடல் - பாரதியார், வறுமை ஈ. சிற்பி - ஒருகிராமத்துநதி–ஒருகிராமத்துநதி	10	CO2
III	சிறுகதைகள் அ.அறிஞர் அண்ணா - செவ்வாழை ஆ. கிருத்திகா - உழவுமாடுகள் இ.வள்ளி.வ. - தணல் துண்டாய் சிலதருணங்கள் ஈ.தி.ஜானகிராமன் - முள்முடி	10	CO3
IV	இலக்கியவரலாறு அ. மரபுக்கவிதையின் தோற்றமும் வளர்ச்சியும் ஆ. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் இ. சிறுகதையின் தோற்றமும் வளர்ச்சியும் ஈ. நாடகத்தின் தோற்றமும் வளர்ச்சியும்	10	CO4
V	அடிப்படை இலக்கணம் அ.முதலெழுத்துகள் மற்றும் சார்பெழுத்துகள் (நன்னூல் விதிப்படிவிளக்கம்) ஆ.வல்லினம் மிகும் மிகா இடங்கள். இ. மரபுப் பெயர்கள் - இளமைப் பெயர்கள்	10	CO5

Text Book:	
1	தமிழ்த்துறை வெளியீடு, கே.எஸ்.ரங்கசாமிகலைஅறிவியல் கல்லூரி(தன்னாட்சி), திருச்செங்கோடு.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	மரபுக்கவிதைகளின் வடிவங்களைஅறிதல்.
CO2	புதுக்கவிதைகளின் வடிவங்கள் மற்றும் பாடுபொருள் தன்மையையைஅறிதல்.
CO3	சிறுகதைகளின் உருவம்,உள்ளடக்கங்களைஅறிதல்
CO4	காலந்தோறும் மாறும் இலக்கியவளர்ச்சியையைஅறிதல்
CO5	எழுத்துகளின் வகைகளைஅறிதல்.

18UENLA101	FOUNDATION ENGLISH – I	SEMESTER – I

COURSE OBJECTIVES:

The course aims to

- Enable the students to develop their comprehensive skill
- Introduce the students to know about English poetry
- Introduce the students to know about English short stories

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**POETRY** William Wordsworth - The Solitary Reaper Margaret Atwood - This Is a Photograph of Me **SHORT STORY** A. J. Cronin - Two Gentlemen of Verona **GRAMMAR** Parts Of Speech Articles **COMPOSITION** Letter Writing – Formal **COMMUNICATION SKILLS** Greeting and Introducing Inviting a Person	20	CO1 & CO2
III & IV	**POETRY** Robert Frost - The Road Not Taken **SHORT STORIES** Pearl S. Buck - The Refugees C. Rajagopalachary – Tree Speaks **GRAMMAR** Kinds of Sentences	20	CO3 & CO4

	COMPOSITION Dialogue Writing **COMMUNICATION SKILLS** Seeking Permission Offering a Suggestion and Giving an Advice		
V	**SHORT STORY** R. K. Narayan - The Axe **GRAMMAR** Question Tag **COMPOSITION** Reading Comprehension **COMMUNICATION SKILLS** Persuading	10	CO5

Text Books:	
1	*G.Damodar, D.Venkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad
2	*M.M.Lukose*. 2010. **Images, A hand book of Stories.** Macmillan Publishers Indian Limited. Chennai.
3	*Dr.A.Shanmugakani,* M.A., Ph.D, **Prose for Communication**. Manimekala Publishing House, Madurai
4	*SasiKumar V and Syamala V*. 2006. **Form and Function A Communicative Grammar for Colleges.** Emerald Publishers. Chennai
5	*Farhathullah T.M.* 2006. **Communication Skills For Undergraduates**. Publishers-RBA Publications. Chennai.
Reference Book:	
1	*Thomas, A.J and Martinet, A.V.* 1994. **A Practical English Grammar.** Oxford University Press. Delhi.

COURSE OUTCOMES (CO)

After completion of the course, the student will be able to:

CO1	Know the different parts of genres in English
CO2	Trace the famous authors of English
CO3	Enrich grammar knowledge
CO4	Stimulate their writing skills
CO5	Deserve appreciation for their communication

20UDSM101	**CORE I: PROGRAMMING IN C**	**SEMESTER - I**

COURSE OBJECTIVES:

The Course aims to

- Acquire the basic knowledge in C programming.
- Develop the basic Programming skills in C language.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	O**verview of C:** History of C - Importance of C – Sample Programs - Basic Structure of C Program- Executing a 'C' Program. **Constants, Variables, and Data Types:** Introduction - Character Set - C Tokens - Keywords and Identifiers - Constants - Variables - Data Types -Overflow and Underflow Data. **Operators and Expressions**: Arithmetic Operators - Relational Operators - Logical Operators - Assignment Operators- Increment and Decrement Operators - Conditional Operator- Bitwise Operators - Special Operators - Arithmetic Expressions - Evaluation of Expressions - Mathematical Functions.	**10**	**CO1**
II	**Managing Input and Output Operations:** Introduction - Reading a Character -Writing a Character - Formatted Input- Formatted Output. **Decision Making and Branching:** Decision Making with IF Statement– Simple IF Statement – The IF…..ELSE Statement– Nesting of IF…..ELSE Statements– The ELSE IF Ladder - The Switch	**10**	**CO2**

	Statement – The ?: Operator – The GOTO Statement.		
III	**Decision Making and Looping:** Introduction - The WHILE Statement– The DO Statement– The FOR Statement - Jumps in LOOPS. **Arrays:** Introduction – One-dimensional Arrays - Declaration of One-dimensional Arrays - Initialization of One-dimensional Arrays – Two-dimensional Arrays - Initializing Two-dimensional Arrays – Multi-Dimensional Arrays. **Character Arrays and Strings:** Declaring and Initializing String Variables- Reading Strings from Terminal - Writing Strings to Screen - Arithmetic Operations on Characters –String-handling Functions.	**10**	**CO3**
IV	**User-defined Functions:** Elements of User-defined Functions - Definition of Functions - Return Values and their Types - Function Calls - Function Declaration - Category of Functions - No Arguments and No Return Values – Arguments but No Return Values – Arguments with Return Values – No Arguments but Returns a Value – Functions that Return Multiple Values - Recursion – The Scope, Visibility and Lifetime of Variables.	**10**	**CO4**
V	**Pointers:** Introduction- Understanding Pointers- Accessing the Address of a Variable- Declaring Pointer Variables- Initialization of Pointer Variables- Accessing a Variable through its Pointer - Pointers and Arrays- Pointers and Character Strings-Array of Pointers- Pointers as Function Arguments-	**10**	**CO5**

	Functions Returning Pointers-Pointers to Functions. **Structures and Unions:** Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Structure Initialization - Array of Structures - Arrays within Structures - Structures within Structures - Unions - Size of Structures - Bit Fields.		

TEXT BOOKS:

1.	*Balagurusamy E*. 2011. **Programming in ANSI C.** [Fifth Edition]. Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1.	*Suresh Srivastava.*K. 2017. **C in Depth**. [Third Edition]. BPB Publications, NewDelhi.
2.	*YashavantKanetkar*. 2016**. Let Us C**. [Fifteenth Edition]. BPB Publications, NewDelhi.
3.	*ThamaraiSelvi S. and Murugesan R*. 1999. **C for all**. [First Edition]. Anuradha Agencies, Kumbakonam.
4.	*Jeyapoovan T.* 2007. **A First Course in Programming with C**. [Second Edition].Vikas Publishing House Pvt. Ltd., New Delhi.
5.	*Deitel&Deitel*. **C How to Program**. [Eighth Edition]. Prentice Hall.
6.	*Byron Gottfried.* **Programming in C**. Tata McGraw Hill.
7.	*Al Kelley & Ira Pohl.* **A Book on C**. [Fourth Edition]. Pearson Education, Asia.

WEB REFERENCES:	
1.	http://www.learn-c.org/
2.	http://www.tutorialspoint.com/cprogramming/
3.	https://www.geeksforgeeks.org/

COURSE OUTCOMES (CO):

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

CO1	Know the basic terminology of C Programming.
CO2	Understand the various operators and its operations.
CO3	Develop programs using control structures and arrays.
CO4	Understand the String handling and functions.
CO5	Develop the program using Pointers and Structure concepts.

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	L	H	H	H
CO2	M	M	H	H	M
CO3	M	H	H	H	H
CO4	M	M	H	H	H
CO5	M	M	M	M	M

H-High; M-Medium; L-Low

20UDSM102	**CORE II: INTRODUCTION TO DATA SCIENCE**	**SEMESTER - I**

COURSE OBJECTIVES:
The Course aims to

- Know the basics of Data science.
- Acquire the knowledge of Data Science and Bigdata.

Credit Points: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Data science in a big data world:** Benefits and uses of data science and big data - Facets of data - The data science process – The big data ecosystem and data science.	**10**	**CO1**
II	**The data science process:** Overview of the data science process - Step 1: Defining research goals and creating a project charter - Step 2: Retrieving data - Step 3: Cleansing, integrating, and transforming data - Step 4: Exploratory data analysis - Step 5: Build the models - Step 6: Presenting findings and building applications on top of them.	**10**	**CO2**
III	**Machine learning:** What is machine learning and why should you care about it? - The modeling process - Types of machine learning - Semi-supervised learning	**10**	**CO3**
IV	**Handling large data on a single computer:** The problems you face when handling large data - General techniques for handling large volumes of	**10**	**CO4**

	data - General programming tips for dealing with large data sets.		
V	**First steps in big data:** Distributing data storage and processing with frameworks - Hadoop: a framework for storing and processing large data sets - Spark: replacing MapReduce for better performance - **Join the NoSQL movement:** Introduction to NoSQL - **Text mining and text analytics:** Text mining in the real world - Text mining techniques.	**10**	**CO5**

TEXT BOOKS:	
1.	*Davy Cielen, Arno D. B. MeysmanMohamed Ali.2016.***Introducing Data Science**. Dreamtech Press.
REFERENCE BOOKS:	
1.	*Jeffrey S. Saltz, Jeffrey.M. Stanton*.2017.[First Edition].**An Introduction to Data Science**. Library of Congress Cataloging-in-Publication.
2.	*Michael Kosta Loukides*.2011.**What is Data Science?.**O'Reilly Media**.**
3.	*Avrim Blum, John Hopcroft, Ravindran Kannan.2020.***Foundations of Data Science.** Library of Congress Cataloging-in-Publication
WEB REFFERENCES:	
1.	https://www.edureka.co/blog/what-is-data-science
2.	https://www.en.m.wikipedia.org/wiki/data_science

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of Data Science.
CO2	Acquire knowledge about Data Science process.
CO3	Understand the concepts of Machine Learning
CO4	Know the concept of large data.
CO5	Gain knowledge of Big Data.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	H	H
CO2	M	M	M	H	H
CO3	M	H	M	H	H
CO4	M	M	M	H	H
CO5	M	M	M	H	H

H-High; M-Medium; L-Low

20UMADSA101	**ALLIED I: DISCRETE MATHEMATICS**	**SEMESTER – I**

Course Objectives:

The Course aims to

- Introduce mathematical logics and theory of automata.
- Introduce basic concepts of graph theory.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs.	CO
I	Logic – Introduction – TF-statements – Connectives – Atomic and Compound statements – Well formed formulae – Truth table of a formula – Tautology. **(Chapter – 9 Sections: 1 – 7)**	**10**	**CO1**
II	Tautological implications and equivalence of formulae – Replacement process – Functionally complete sets of connectives and duality law – Normal forms – Principal normal forms. **(Chapter – 9 Sections: 8 - 12)**	**10**	**CO2**
III	Theory of inference – Open statements – Quantifiers. **(Chapter – 9 Sections: 13 – 15)**	**10**	**CO3**
IV	Boolean algebra – Boolean polynomials – Karnaugh map (K-map for 5 variables and 6 variables are not included) – Switching circuits (Simple circuits). **(Chapter: 10 Sections: 5 – 8)**	**10**	**CO4**
V	Graph Theory – Basic concepts – Matrix representation of graphs – Trees – Spanning trees. **(Chapter: 11 Sections: 1 – 4)**	**10**	**CO 5**

TEXT BOOKS:	
1.	*Venkataraman, M.K. Sridharan, N. and Chandrasekaran, N.,* 2000. **Discrete Mathematics.** The National Publish Company, New Delhi.
2.	*Mishra, K.L.P., and Chandrasekaran, N.,* 2001. **Theory of Computer Sciences.** [Second Edition]. Prentice Hall of India Private Limited, New Delhi.
REFERENCE BOOK:	
1.	*Trembley, J.P. and Manohar, R.,* 1975. **Discrete Mathematical Structures with applications to computer Science.** International Edition, McGraw Hill Publication.

COURSE OUTCOMES (CO)

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

CO1	Learn the concepts of logic
CO2	Discuss various normal forms
CO3	Understand the concepts of inference theory
CO4	Construct Karnaugh map and switch circuits
CO5	Know the concepts of graphs and trees

20UDSMP101	**CORE PRACTICAL I: PROGRAMMING IN C**	**SEMESTER - I**

COURSE OBJECTIVES:

The course aims to

- Acquire the knowledge of C language.
- Develop basic programming skills.

Credits: 2 **Total Hours: 24**

S.No.	**PROGRAMS**	**Hrs**	**CO**
1.	Program to find the Simple interest and Compound interest.	**3**	**CO1**
2.	Program to find the Fibonacci Series.	**3**	**CO2**
3.	Program to Sort N numbers using Array.	**3**	**CO3**
4.	Program to perform Matrix addition and subtraction.	**3**	**CO3**
5.	Program to check the given string is a Palindrome.	**3**	**CO3**
6.	Program to print Employee details using User defined functions.	**3**	**CO4**
7.	Program to display the Student Details using Structure.	**3**	**CO4**
8.	Program to Swap two numbers using Pointers.	**3**	**CO5**

WEB REFERENCES:

1.	https://www.cprogramming.com/tutorial/c-tutorial.html
2.	http://www.learn-c.org/
3	https://www.geeksforgeeks.org

COURSE OUTCOMES (CO):

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

CO1	Develop simple programs.
CO2	Implement various control structures.
CO3	Develop program using Arrays and String Handling concepts.
CO4	Implement Function and Structure concepts.
CO5	Understand Pointer concepts.

20UDSMP102	**CORE PRACTICAL II: DATA ANALYSIS IN EXCEL**	**SEMESTER – I**

COURSE OBJECTIVE:

The Course aims to

- Explore the knowledge in Data Analysis.

Credits: 2 **Total Hours: 16**

S.No	PROGRAMS	Hrs	CO
1.	Generate the list of Random Numbers (with and without boundaries).	**2**	**CO1**
2.	Create rank for list of given numbers.	**2**	**CO1**
3.	Create a worksheet and find Mean, Median and Mode.	**2**	**CO2**
4.	Create a worksheet and find the Range and Standard Deviation.	**2**	**CO3**
5.	Create a worksheet to calculate Percentiles and Quartiles.	**2**	**CO4**
6.	Create a Histogram for a given set of values.	**2**	**CO5**
7.	Create a Box and Whisker Plot.	**2**	**CO5**
8.	Perform a Single factor ANOVA to test the null Hypothesis.	**2**	**CO5**

WEB REFERENCES:

1.	https://www.tutorialspoint.com
2.	https://www.free-computer-tutorials.net
3.	https://www.edu.getglobal.org

COURSE OUTCOMES (CO):

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

CO1	Create worksheets and workbooks with values.
CO2	Understand the basic concepts of spreadsheets and usage of formulae.
CO3	Enhance the Data Analytics.
CO4	Create and manipulate data.
CO5	Improve the quality of output in terms of Visualization.

18UVE101	VALUE EDUCATION I: YOGA	SEMESTER – I

COURSE OBJECTIVES:

The course aims to

- Understand physical body and Health concepts.
- Have the basic Knowledge on Simplified Physical Exercises and Asanas and Meditation.
- Introspect and improve the behaviors.
- Inculcate cultural behavioral patterns.

Credits: 2 **Total Hours: 30**

UNIT	CONTENTS	Hrs	CO
I	**Yoga and Physical Health:** Health - Meaning and Definition - Physical Structure - Three bodies - Five limitations - Simplified Physical Exercises - Hand, Leg, Breathing, Eye exercises - Kapalabathi,Makarasana 1, 2 , Massage, Acupressure, Relaxation exercises - Yogasanas – Surya namaskar - Padmasana - Vajrasana - ArdhakattiChakrasana - Viruchasana - Yogamudra - Patchimothasana - Ustrasana - Vakkarasana – Salabasana	6	CO1
II	**Greatness of Life Force and Mind:** Maintaining youthfulness - Postponing the ageing process - Sex and spirituality - Significance of sexual vital fluid - Married life - Chastity - Development of mind in stages - Mental Frequencies - Methods for Concentration - Meditation and its Benefits	6	CO2
III	**Personality Development – Sublimation:** Purpose and Philosophy of Life - Introspection - Analysis of Thought - Moralization of Desire - Analysis and practice - Neutralization of Anger - Strengthening of will-power	6	CO3
IV	**Human Resources Development:** Eradication of Worries - Analysis and Eradication practice - Benefits of Blessings – Effect of good vibrations - Greatness of Friendship - Guidance for good	6	CO4

	Friendship – Individual Peace and world peace - Good cultural behavioral patterns		
V	**Law of Nature:** Unified force - Cause and effect system - Purity of thought deed and Genetic Centre – Love and Compassion - Gratitude - Cultural Education - Fivefold culture.	**6**	**CO5**
TEXT BOOK:			
1.	Value Education - World Community Service Centre, Vethathiri Publications, Erode.		
REFERENCE BOOKS:			
1.	*Vethathiri Maharishi*, 2011, Journey of Consciousness, Erode, Vethathiri Publications.		
2.	*Vethathiri Maharishi*, 2014, Simplified Physical Exercises, Erode, Vethathiri Publications.		
3.	*Vethathiri Maharishi*, 2004, Unified force, Erode, Vethathiri Publications		
4.	Yoga for Modern age - ThathuvagnaniVethathiri Maharishi		
5.	Sound Health through yoga – Dr. K. Chandrasekaran, November 1999 PremKalyan Publications, Madurai		
6.	Light on yoga - BKS. Iyenger		
7.	ThathuvagnaniVethathiri Maharishi – Kayakalpa yoga – First Edition 2009 – Vethathiri Publications, Erode.		
8.	Environmental Studies - Bharathidasan University Publication Division		

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Understand the physical structure and simplified physical exercises.
CO2	Nurture the life force and mind.
CO3	Introspect and improve the moral values.
CO4	Realize the importance of human resources development.
CO5	Enhance purity of thought and deed.

18UTALA201	Tamil – II: சமய இலக்கியங்கள்	பருவம் - II

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- சமய இலக்கியங்களைஅறிமுகம் செய்தல்
- சமயச் சான்றோர் நிலைப்பாட்டைஉணர்த்துதல்
- சமயங்கள் வளர்த்ததமிழைஅறியச் செய்தல்

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	சைவ,வைணவ இலக்கியங்கள் அ. சம்பந்தர் தேவாரம் - திருக்கொடிமாடச்செங்குன்றூர்- (முதல் ஐந்துபாடல்கள்) ஆ. மாணிக்கவாசகர் - திருவம்மானை - (முதல் ஐந்துபாடல்கள்) இ. பெரியாழ்வார் - திருப்பல்லாண்டு (முதல் ஐந்துபாடல்கள்) ஈ. ஆண்டாள் - திருமணக் கனவு (முதல் ஐந்துபாடல்கள்)	10	CO1
II	கிறித்துவ, இசுலாமிய இலக்கியங்கள் அ. இரட்சணியயாத்திரிகம் - சிலுவைப்பாடு (முதல் பத்துப்பாடல்கள்) ஆ. நாயகம் ஒருகாவியம்–பாம்பின் நேசமும் தோழரின் பாசமும் (முதல் பத்துப்பாடல்கள்)	10	CO2
III	சமயச் சான்றோர் வரலாறு அ. சைவசமயச் சான்றோர்கள் 1. திருஞானசம்பந்தர், 2. திருநாவுக்கரசர், 3. சுந்தரர், 4. மாணிக்கவாசகர் 5. சேக்கிழார் ஆ. வைணவசமயச் சான்றோர்கள் 1. முதலாழ்வார்கள் 2. திருமங்கையாழ்வார் 3.ஆண்டாள் 4. நாதமுனிகள்	12	CO3
IV	சமய இலக்கியவரலாறு அ.பன்னிரு திருமுறைகள் ஆ. பதினெண்சித்தர்கள்	8	CO4

	இ. நூலாயிர திவ்யபிரபந்தம் ஈ. சைவசித்தாந்தசாத்திரங்கள்		
V	இலக்கணமும் மொழித்திறனும் அ. ஆகுபெயர் ஆ. தொகைச்சொற்கள் இ. மயங்கொலிச்சொற்கள் (ர,ற வேறுபாடுகள்) ஈ. நேர்காணல்	10	CO5

Text Book:	
1	தமிழ்த்துறை. வெளியீடு : கே.எஸ்.ரங்கசாமி கலை அறிவியல் கல்லூரி (தன்னாட்சி),திருச்செங்கோடு– 637 215

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	தேவார,திவ்யபிரபந்தச் சிறப்பினைஉணர்தல்.
CO2	கிறித்துவ, இசுலாமிய காவியங்களின் சிறப்பினை உணர்தல்.
CO3	சைவசமய, வைணவசமயச் சான்றோர் சிறப்புக்களை உணர்தல்.
CO4	சமயவளர்ச்சி, இலக்கியவளர்ச்சி ஆகியவற்றை உணர்தல்
CO5	ஆகுபெயர் வகைகளை உணர்தல், மொழித்திறன் பெறுதல்.

18UENLA201	FOUNDATION ENGLISH – II	SEMESTER – II

COURSE OBJECTIVES:

The course aims to

- Enable the students to develop their comprehensive skill
- Introduce the students to know about English poetry and short stories

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**POETRY** Langston Hughes - I, Too **SHORT STORIES** Vsevolod M. Garshin - The Signal W. Somerset Maugham - The Man with the Scar **GRAMMAR** Tenses (Present, Past & Future) **COMPOSITION** E-mail SMS **COMMUNICATION SKILLS** Asking Questions	20	CO1 & CO2
III & IV	**POETRY** Chinua Achebe - Refugee Mother and Child Nissim Ezekiel - Goodbye Party for Miss Pushpa T. S **SHORT STORY** H. G. Wells - The Stolen Bacillus **GRAMMAR** Voices (Active and Passive) **COMPOSITION** Note Making, Note Taking	20	CO3 & CO4

	COMMUNICATION SKILLS Praising and Complimenting Complaining and Apologizing		
V	**POETRY** Tripuraneni Srinivas - I Will Embrace only the Sun **SHORT STORY** O. Henry - One Thousand Dollars **COMPOSITION** Discourse Pattern **COMMUNICATION** **SKILLS** Expressing Sympathy Phoning	**10**	**CO5**

Text Books:	
1	*G.Damodar, DVenkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad –500 029
2	*M.M.Lukose*. 2010. **Images, A hand book of Stories.** Macmillan Publishers Indian Limited. Chennai–600 041
3	*SasiKumarV and SyamalaV*. 2006. **Form and Function A Communicative Grammar for Colleges.** Emerald Publishers. Chennai–600 008
4	*T.M.Farhathullah.* 2006. **Communication Skills For Undergraduates**. Publishers-RBA Publications. Chennai–600 015.

Reference Books:	
1	*Thomas, A.J and Martinet, A.V.* 1994. **A Practical English Grammar.** Oxford University Press. Delhi.
2	*Martin Hewings.* 1999. **Advanced English Grammar.** Cambridge University Press. New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Know the different parts of genres in English
CO2	Identify the famous authors of English
CO3	Enrich their grammar knowledge
CO4	Stimulate their writing skills
CO5	Deserve appreciation for their communication

20UDSM201	**CORE III: OBJECT ORIENTED PROGRAMMING WITH C++**	**SEMESTER - II**

COURSE OBJECTIVES:

The course aims to

- Understand the improvements of C++ over C.
- Know the Object Oriented Features in C++.
- Understand the concept of Files and Templates.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Principles of Object-Oriented Programming**: A look at Procedure-Oriented programming -Object Oriented Programming paradigm - Basic concepts and Benefits of Object Oriented Programming- Object Oriented Languages– Applications of OOP. **Beginning with C++:** What is C++? - More C++statements- structure of C++ program. **Tokens, Expressions and Control Structures**: Introduction-Tokens– Keywords-Identifiers and Constants–Basic Data Types– User Defined Data Types– Derived Data Types - Symbolic Constants- Operators in C++ - Scope Resolution Operator- Member Dereferencing Operators–Memory Management Operators–Manipulators- Expressions and their Types- Operator Overloading-Operator Precedence-Control Structures.	**10**	**CO1**
II	**Functions in C++**: Introduction- The Main Function – Function Prototyping – Call by Reference – Return by Reference — Inline functions – default Arguments - Const Arguments -Function Overloading - Friend and Virtual	**10**	**CO2**

	Functions. **Classes and Objects**: Introduction-Specifying a class- Defining Member functions– Making an Outside Function Inline - Nesting of member functions – Private member functions – Memory allocation for objects - Static data members – Static member functions – Arrays of Objects-Friendly functions –Const member functions.		
III	**Constructors and Destructors**: Introduction – Constructors - Parameterized Constructor - Multiple constructors in a class – Constructor with Default Arguments - Dynamic initialization of objects – Copy and dynamic constructors – Destructors. **Operator overloading and Type Conversions**: Introduction - Defining operator overloading -Overloading unary and binary operators – Rules for Overloading Operators.	**10**	**CO3**
IV	**Inheritance: Extending Classes:** Introduction – Defining Derived classes - Single inheritance - Making a private member inheritable – Multilevel Inheritance–Multiple Inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes – Member classes: Nesting of classes. **Pointers, Virtual Functions and Polymorphism**: Introduction - Pointers to objects - Virtual Functions - Pure Virtual Functions.	**10**	**CO4**
V	**Managing console I/O operations**: Introduction – C++Streams – C++ Stream classes – Unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators. **Working with Files**: Introduction - Classes for file stream operations –Opening and Closing a file– Detecting end of file – More about	**10**	**CO5**

	Open(): File modes - File pointers and their Manipulations – Sequential input and output operations- updating a file: random access-Error handling during file operations - Command line arguments. **Templates:** Introduction - Class Templates - Class Templates with Multiple Parameters - Function Templates - Function Templates with Multiple Parameters.		
TEXT BOOK:			
1.	*Balagurusamy, E.* 2010. **Object Oriented Programming with C++**. [Fourth Edition]. Tata McGraw Hill Education Pvt. Limited, New Delhi.		
REFERENCE BOOKS:			
1	*ReemaThareja.* 2015. **Object Oriented Programming in C++**. Oxford University Press,India.		
2	*BhushanTrivedi.* 2013. **Programming with ANSI C++**. [Second Edition].OUP India.		
WEB REFERENCES:			
1.	https://www.tutorialspoint.com/cplusplus		
2.	http://www.cplusplus.com/doc/tutorial		
3.	https:// www.javatpoint.com/cpp-tutorial		

COURSE OUTCOMES (CO):

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

CO1	Understand the difference between Procedure-oriented and Object-Oriented Programming.
CO2	Create classes and objects with different types of functions.
CO3	Use Constructor and Destructor functions in a proper way.
CO4	Approach a program logically using Inheritance and Polymorphism.
CO5	Understand I/O Streams, File Pointer concepts and Templates.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H
CO2	M	H	H	H	M
CO3	M	H	H	H	M
CO4	M	M	H	H	H
CO5	M	H	M	M	H

H-High; M-Medium; L-Low

20UDSM202	**CORE IV: DATA STRUCTURES**	**SEMESTER - II**

COURSE OBJECTIVES: **Note: Excluding Programs.**

The course aims to

- Know the fundamental concepts of Data Structures.
- Develop applications using algorithms.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	HRS	CO
I	**Introduction to Data Structures**: Introduction-Types of Data Structures-Abstract Data Type- Time and Space Complexity-Big-Oh Notation. **Arrays:** Introduction- Declaration of Arrays-Accessing Array Elements- Storing Values in Arrays- Calculating the Length of an Array -Operations on Arrays -Two-dimensional Arrays-Multi- dimensional Arrays.	**10**	**CO1**
II	**Linked Lists:** Introduction - Linked List Versus Arrays – Memory Allocation and De-Allocation for a Linked List - Singly Linked List- Polynomial Representation- Circular Linked List-Doubly Linked List.	**10**	**CO2**
III	**Stacks and Queues:** Stacks- Array Representation of Stacks-Operations on a Stack- Linked Representation of Stack-Operations on a Linked Stack- Infix, Postfix and Prefix Notation-Evaluation of an Infix Expression- Convert Infix Expression to prefix Expression-Applications of stack.**Queues:** Array Representation of Queues- Circular Queue- Linked Representation of Queue- Operation on a Queue- Deque - Priority Queues – Multiple Queues.	**10**	**CO3**
IV	**Trees:** Binary Trees-Expression Trees- Traversing of a Binary Tree.**Efficient Binary Trees:** Binary search Trees- Operations on	**10**	**CO4**

	Binary Search Trees. **Graphs:** Introduction- Representation of Graphs-Graph traversal Algorithms.		
V	**Graphs:** Shortest Path Algorithms- Minimum Spanning Tree- Prim's Algorithm- Kruskal's Algorithm- Dijkstra's Algorithm- Applications of Graphs. **Sorting:** Introduction- Bubble Sort- Insertion Sort- Selection Sort- Merge Sort- Quick Sort– Heap Sort.	**10**	**CO5**
TEXTBOOK:			
1	*ReemaThareja.*2012.**Data Structures Using C.**[First Edition]. Oxford University Press, New Delhi.		
REFERENCE BOOKS:			
1	*A.K.Sharma. 2011.* **Data Structures Using C.** [Second Edition]. BPB Publications,NewDelhi		
2	*Seymour Lipschutz.* 2010. **Data Structures with C.** [First Edition]. McGraw Hill, International Editions, Schaum's Outline Series, New Delhi.		
3	*R.S.Salaria.***Data Structures and Algorithms Using C**. [Fifth Edition]. Khanna Publishing, New Delhi. Paperback - 2018		
4	*G.A.V.Pai.* 2008. **Data Structures and Algorithms: Concepts, Techniques and Applications.** [First Edition]. McGraw Hill, International Editions, New Delhi. Paperback – 1 Jul 2017		
WEB REFERENCES:			
1.	https://www.geeksforgeeks.org/data-structures/		
2.	https://www.edx.org/course/data-structures-fundamentals		
3.	https://www.studytonight.com/data-structures/introduction-to-data-structures		

COURSE OUTCOMES (CO):

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

CO1	Attain the knowledge of linear and non-linear data structures and analyze the efficiency of the algorithms.
CO2	Handle operations like searching, insertion, deletion, traversing mechanism on linked list.
CO3	Understand the stack and queue with its applications.
CO4	Demonstrate different methods for traversing trees.
CO5	Demonstrate knowledge of various sorting and searching techniques.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	H
CO2	M	H	H	H	H
CO3	M	H	H	H	H
CO4	M	H	H	H	H
CO5	H	H	H	H	H

H-High; M-Medium; L-Low

20UMADSA201	**ALLIED II: STATISTICS I**	**SEMESTER – II**

Course Objective:

The Course aims to

- Learn the strategies of research field and also to provide knowledge to understand the role of statistics in research.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs.	CO
I	**Introduction:** Definition – Function of Statistics – Limitations of Statistics – Collection of data – Classification and Tabulation – Graphic Representation.	**10**	**CO 1**
II	**Measures of Central Tendency:** Arithmetic Mean – Median – Mode – Geometric mean – Harmonic mean.	**10**	**CO 2**
III	**Measures of Dispersion and Variability:** Range – Inter Quartile Range and Quartile Deviation – Mean Deviation – Standard deviation – Coefficient of variation.	**10**	**CO 3**
IV	**Correlation Analysis:** Types of correlation – Methods of studying Correlation (Excluding Correlation of grouped data). **Regression Analysis:** Regression line – Regression equations (Excluding Method of Least Square).	**10**	**CO 4**
V	**Sampling and Test of Significance:** Steps in test of hypothesis – Test of significance of small samples (t and F) – Chi-square test (Problems only).	**10**	**CO 5**

Text Book:

1.	*Pillai, R.S.N. and Bagavathi, V.* 2012. **Statistics.** [Seventh Edition]. S.Chand and Company Ltd., New Delhi.

Reference Books:

1.	*Gupta, S.P.* 2008. **Statistical Methods.** [Thirty Seventh Edition]. Sultan Chand and Sons, New Delhi.
2.	*Mariappan, P.* 2008. **Statistics for Scientific Solutions (Business Statistics).** [First Edition]. New Century Book House Private Ltd., Chennai.

COURSE OUTCOMES (CO)

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

CO1	Learn the importance of statistics
CO2	Understand the concepts of measures of central tendency
CO3	Know the concepts of measures of dispersion
CO4	Gain knowledge on correlation and regression analysis
CO5	Discuss the test of significance

20UDSMP201	**CORE PRACTICAL III: PROGRAMMING IN C++**	**SEMESTER - II**

COURSE OBJECTIVES:

The course aims to

- Implement the various OOPs concepts.
- Understand the features in C++.

Credits: 2 **Total Hours: 24**

S.No	PROGRAMS	Hrs	CO
1.	Program for Classes and Objects using Scope Resolution Operator.	**3**	**CO1**
2.	Program for Inline and Friend functions.	**3**	**CO2**
3.	Program using Function and Operator Overloading.	**3**	**CO2**
4.	Program using Constructor and Destructor.	**3**	**CO2**
5.	Program to prepare student mark statement using Multiple Inheritance.	**3**	**CO3**
6.	Program to read and write values for sequential file.	**3**	**CO4**
7.	Program to implement Singly Linked List.	**3**	**CO5**
8.	Program to implement the Stack and Queue.	**3**	**CO5**

WEB REFERENCES:

1.	https://www.jdoodle.com/online-compiler-c++
2.	https://www.cpp.thiyagaraaj.com/c-programs/c-basic-example-programs
3.	https://www.programiz.com/cpp-programming/examples

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Implement OOPs concepts.
CO2	Understand the various concepts associated with members functions.
CO3	Explore concepts associated with Inheritance.
CO4	Implement concepts associated with Files.
CO5	Explore the Data Structures Concepts.

18UVE201	VALUE EDUCATION II: ENVIRONMENTAL STUDIES	SEMESTER – II

COURSE OBJECTIVES:

The course aims to

- Enable the students acquire knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.
- Implicate awareness among young minds for safeguarding environment from manmade disasters.

Credits: 2 **Total Hours: 30**

UNIT	CONTENTS	Hrs	CO
I	Environment– Definition– Scope– Structure and function of ecosystems- producers, consumers and decomposers- Energy flow in the ecosystem- Ecological succession– food chain, food webs and ecological pyramids– Concept of sustainabledevelopment.	06	CO1
II	Natural resources: Renewable- air, water, soil, land and wildlife resources. Non–renewable – Mineral coal, oil and gas. Environmental problems related to the extraction and use of natural resources.	06	CO2
III	Biodiversity– Definition– Values– Consumption use, productive social, ethical, aesthetic and option values threats to bio diversity – hotspots of bio diversity– conservation of bio- diversity: in– situ Ex– situ. Bio– wealth - National and Global level.	06	CO3
IV	Environmental Pollution :Definition– causes, effects and mitigation measures– Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution– Nuclear	06	CO4

	hazards – Solid wastes acid rain–Climate change and global warming environmental laws and regulations in India– Earth summit.		
V	Population and environment – Population explosion – Environment and human health – HIV/AIDS – Women and Child welfare – Disaster Management - Resettlement and Rehabilitation of people, Role of information technology in environmental health – Environmental awareness.	**06**	**CO5**

TEXT BOOK:

1.	Department of Biochemistry. Environmental Studies (Study Material) Published by K.S.Rangasamy College of Arts & Science (Autonomous). Tiruchengode.

REFERENCE BOOK:

1.	*ErachBharucha*. 2005. **Textbook of Environmental studies**. Universities press. PVT. Ltd.

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Describe the types of ecosystem and concepts in sustainable development.
CO2	Explain the importance of natural resources and environmental problems.
CO3	Recite about the biodiversity, hot spots of biodiversity and its conservation.
CO4	Be conscious on the effects of pollution and population explosion.
CO5	Implement the preventive measures for environmental issues.

18UTALA301	TAMIL – III: காப்பியம் - சிற்றிலக்கியம்	பருவம் - III

இப்பாடத்திட்டத்தின் நோக்கங்களாவன:

- தமிழ்க் காப்பியங்கள் தோற்றத்தையும்,காப்பிய இலக்கணத்தையும் காப்பியவகைகளையும் அறிமுகம் செய்தல்.
- சிற்றிலக்கியங்கள் தோற்றம்,வளர்ச்சிநிலைகளையும்,சிற்றிலக்கியங்களையும் அறிமுகம் செய்தல்.
- பகுபதஉறுப்புக்களைக் கற்பித்தல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	காப்பியங்கள் - சிலப்பதிகாரம் - வழக்குரைகாதை மணிமேகலை - மலர்வனம் புக்ககாதை.	10	**CO1**
II	பிறகாப்பியங்கள் - கம்பராமாயணம் - குகப் படலம் பெரியபுராணம் - இளையான்குடிமாறநாயனார் புராணம்.	10	**CO2**
III	சிற்றிலக்கியங்கள் - குற்றாலக் குறவஞ்சி– வசந்தவல்லியின் காதல் (1-10 பாடல்) கலிங்கத்துப் பரணி - பேய்களைப் பாடியது.	10	**CO3**
IV	இலக்கியவரலாறு - காப்பியங்கள் - ஐம்பெருங்காப்பியங்கள் - ஐஞ்சிறுகாப்பியங்கள் -புராணங்கள் - சிற்றிலக்கியங்கள்.	10	**CO4**
V	இலக்கணமும் மொழிப்பயிற்சியும் - பகுபதஉறுப்பிலக்கணம் - சீர் வகைகள் - வழுஉச் சொற்கள் - கடிதம் எழுதுதல்.	10	**CO5**

Text Book:

1	தமிழ்த்துறை வெளியீடு, கே.எஸ்.ரங்கசாமி கலை அறிவியல் கல்லூரி(தன்னாட்சி), திருச்செங்கோடு-637 215.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	இரட்டைக் காப்பியங்களின் மேன்மைநிலையை உணர்தல்.
CO2	காப்பியக்காலகுடிகளின் நிலையை,உரிமையையுணர்தல்.
CO3	சிற்றிலக்கியங்களின் சிறப்பை உணர்தல்.
CO4	காப்பிய,சிற்றிலக்கியங்களின் வரலாறு குறித்த செய்திகளைஅறிதல்.
CO5	இலக்கணம் மற்றும் மொழிப்பயிற்சியின் அமைப்பை உணர்தல்.

18UENLA301	FOUNDATION ENGLISH – III	SEMESTER – III

COURSE OBJECTIVES:

The course aims to

- Enable the students to develop their comprehensive skill
- Promote language skills through literature

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**ONE ACT PLAY** A. Ball - The Seven Slaves **PROSE** Somerset Maugham - Mr. Know –All **GRAMMAR** Degrees of Comparison **COMPOSITION** Advertisement **COMMUNICATION SKILLS** Speaking About Oneself The Media	20	CO1 & CO2
III & IV	**ONE ACT PLAY** R.H. Wood - Post Early for Christmas **PROSE** Satyajit Ray - Film Making **GRAMMAR** Determiners **COMPOSITION** Resume Writing	20	CO3 & CO4
	COMMUNICATION SKILLS Imagining Context specific expression - Master of Ceremonies		

V	**PROSE** Isai Tobolsky - Not Just Oranges **GRAMMAR** Reported Speech **COMPOSITION** Precise Writing **COMMUNICATION SKILLS** Inviting Personalities.	**10**	**CO5**

Text Books:	
1	*G.Damodar, D.Venkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli.* 2009. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad –500 029.
2	*Ramamurthy.K.S. 1984.* **Seven-Act Plays**. Published in India by Oxford University. New Delhi–110 001.
3	*Sasi Kumar V and Syamala V*. 2006. **Form and Function - A Communicative Grammar for Colleges.** Emerald Publishers. Chennai–600 008.
4	*T.M.Farhathullah.* 2006. **Communication Skills For Undergraduates**. Publishers-RBA Publications. Chennai–600 015.
Reference Books:	
1	*Raymond Murphy*. 1994. **Intermediate English Grammar.** Cambridge University India Pvt. Ltd, Delhi.

COURSE OUTCOMES (CO)

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

CO1	Know the different parts of genres in English
CO2	Trace the famous authors of English
CO3	Enrich their grammar knowledge
CO4	Stimulate their writing skills
CO5	Deserve appreciation for their communication

20UDSM301	**CORE V: PROGRAMMING IN JAVA**	**SEMESTER - III**

COURSE OBJECTIVES:

The course aims to

- Understand the fundamentals of Object Oriented Programming.
- Explore the programming skills using Java.

Credits: 4 **Total Hours:50**

UNIT	CONTENTS	Hrs	CO
I	**Java Evolution**: Java History – Java Features-How Java differs from C and C++- Java and Internet – Java and World Wide Web- Web Browsers. **Overview of Java Language:** Simple Java program- Java program Structure- Java Tokens- Java Statements – Java Virtual Machine. **Constants, Variables and Data Types**: Constants- Variables -Data Types- Declaration of Variables – Giving values to variables- Scope of variables- Symbolic Constants- Type casting- Getting value of variables- Standard and default values.	**10**	**CO1**
II	**Operators and Expressions**: Introduction- Arithmetic Operators- Relational Operators- Logical Operators- Assignment Operators- Increment and Decrement Operators- Conditional Operator- Bitwise Operators- Special Operators- Arithmetic Expressions- Evaluation of Expressions- Precedence of Arithmetic operators- Type conversions in Expressions- Operator Precedence and Associativity -Mathematical functions. **Decision Making and Branching:** Decision making with if Statement- Simple if Statement - The If..Else statement - Nesting of If..Else Statements - The Else If Ladder- The Switch Statement- The ?: Operator. **Decision Making and Looping:** The while Statement- The do	**10**	**CO2**

	Statement- The For Statement- Jumps in Loops-Labeled Loops.		
III	**Classes, Objects and Methods:** Introduction-Defining a Class-Fields Declaration-Methods Declaration-Creating Objects-Accessing Class Members – Constructors-Methods Overloading-Static Members-Nesting of Methods-Inheritance: Extending a Class-Overriding Methods-Final Variables and Methods-Final Classes-Finalizer Methods-Abstract Methods and Classes-Methods with Varargs -Visibility Control. **Arrays, Strings and Vectors:** Introduction – One-dimensional Arrays-Creating anArray- Two-dimensional Arrays–Strings – Vectors-Wrapper Classes - Enumerated Types. **Interfaces**: **Multiple Inheritance:** Introduction-Defining Interfaces-Extending Interfaces-Implementing Interfaces-Accessing Interface Variables. **Packages**: **Putting classes Together:** Introduction-Java API Packages-Using System Packages-Naming Conventions-Creating Packages-Accessing a Package-Using a Package-Adding a Class to a Package-Hiding Classes-Static Import.	**10**	**CO3**
IV	**Multithreaded Programming:** Introduction-Creating Threads-Extending the Thread Class- Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Exception-Thread Priority-Synchronization-Implementing the 'Runnable' Interface. **Managing Errors and Exceptions:** Introduction-Types of Errors- Exceptions-Syntax of Exception Handling Code-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions-Using Exception for Debugging.	**10**	**CO4**
V	**Applet Programming:** Introduction –How Applets Differ from Applications-Preparing to Write Applets-Building Applet Code-Applet Life Cycle- Creating an Executable Applet-Designing a	**10**	**CO5**

	Web Page-Applet Tag-Adding Applet to HTML File-Running the Applet-More About Applet Tag-Passing Parameters to Applets-Aligning the Display-More about HTML Tags-Displaying Numerical Values-Getting Input from the User.**Managing Input/Output Files in Java**: Introduction - Concepts of Streams-Stream Classes – Byte Stream classes- Character stream classes-Using streams – Other Useful I/O Classes – Using the File Class – Input/Output Exceptions – Creation of Files – Reading / Writing Characters- Reading / Writing Bytes -Handling Primitive Data Types – Random Access Files.		

TEXTBOOK:	
1	*Balagurusamy E.* 2008**. Programming with Java – A Primer**. **[**Third Edition].Tata McGraw Hill Education Pvt. Limited, New Delhi.
REFERENCE BOOKS:	
1	*Hebert Schildt***.** 2002**. The Complete Reference Java 2.** [Tenth Edition]. Tata McGraw Hill Education Pvt. Limited, New Delhi. Paperback edition 2017
2	*S.Horstmann*.2019.Core Java,Volume II-Advanced Features[eleventh Edition].Prentice Hall of India Pvt. limited,New Delhi.
3	*Debasish Jana***.** 2005. **Java and Object-Oriented Programming Paradigm**. [Second Printing]. Prentice Hall of India, New Delhi.
WEB REFERENCES:	
1.	http://www.javapoint.com/java-tutorial
2.	http://www.beginnersbook.com/java-tutorial/
3.	http://tutuorialspoint.com/java

COURSE OUTCOMES (CO):

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

CO1	Understand the basic terminology of Java Programming
CO2	Develop programs using control structures
CO3	Able to understand the interfaces and packages
CO4	Understand the multithreaded programming and exceptions
CO5	Develop program using Applets and files

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	L
CO2	M	H	M	H	H
CO3	M	M	M	M	H
CO4	M	M	M	M	H
CO5	M	H	M	H	H

H-High; M-Medium; L-Low

20UDSM302	CORE VI: BIG DATA ANALYTICS	SEMESTER - III

COURSE OBJECTIVES:

The Course aims to

- Apply Hadoop ecosystem components.
- Participate data science and big data analytics projects.

Credit Points: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Big data Introduction:** What is big data–why big data–convergence of key trends -unstructured data – industry examples of big data – Web analytics - big data and marketing – fraud and big data - risk and big data – credit risk management – big data and algorithmic trading - big data and healthcare – big data in medicine – advertising and big data – big data technologies - cloud and big data–mobile business intelligence – crowd sourcing analytics.	10	CO1
II	**Hadoop:** History of Hadoop - The Hadoop Distributed File System–componenets of hadoop-Analyzing the Data with Hadoop - Design of HDFS - How MapReduce Works Anatomy of a Map Reduce – Map Reduce types and formats-Map Reduce features.	10	CO2
III	**Cassandra and Hive:** Introduction to CassandraCassandra data model – Cassandra examples. Hive – data definition – HiveQL data manipulation – HiveQL queries.– Drawbacks of Relational Database - types and file formats – HiveQL data	10	CO3
IV	**Pig and MongoDB:** Pig Introduction–Pig Grunt–Pig data model–Pig Latin. Introductionto NoSQL – document based database - MongoDB Introduction - Data Model - Working	10	CO4

	with data - Replication and Sharding – Development		
V	**Graph Databases:** Graph databases–Introduction - Neo4J - Key concept and characteristics -Modeling data for neo4j - Importing data into neo4j - visualizations - neo4j - Cypher Query Language – data visualization - creating visual analytics with RapidMiner.	**10**	**CO5**
TEXT BOOKS:			
1.	*Tom White*. 2012.**Hadoop: The Definitive Guide**.[Fourth Edition]. O'Reilly Publishers.		
2.	**The Definitive Guide to Mongodb** 2013.[Second Edition]. O'Reilly Media publishers.		
REFERENCE BOOKS:			
1.	*Rik Van Bruggen*.2014. **Learning Neo4j**.[Second Edition]. PacktPubishers.		
2.	*Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk,RafaelCoss*.2014. **Hadoop For Dummies**. John Wiley and sons publishers.		

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of big data
CO2	Acquire knowledge about Hadoop
CO3	Understand the concept of Cassandra and Hive
CO4	Know about Pig and MongoDB
CO5	Gain knowledge on graph Database

MAPPING

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UMADSA301	ALLIED III: STATISTICS II	SEMESTER – III

Course Objectives:

The Course aims to

- Learn the strategies of research field and also to provide knowledge.
- Understand the role of statistics in research.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs.	CO
I	**Probability:** Introduction – Classical Definition – Additional Theorem – Odds in favour and odds against an Event –Axioms of Probability --Theorems – Conditional Probability – Multiplicative Law of Conditional Probability – Baye's Theorem – Independent Events. **(Chapter 1)**	**10**	**CO 1**
II	**Random Variables:** Discrete Random Variable – Continuous Random Variable –Properties of Distribution Function – Function of a Random Variable. **Mathematical Expectations:** Expectation or Mean Value – Definition – Functions of a Random variable – Definition – Theorem – Properties of Expected Values – Theorem. **(Chapter 2 Sections: 2.1 - 2.14) (Chapter 3)**	**10**	**CO 2**
III	**Binomial Distribution:** Binomial Frequency distribution – Moments of the Binomial Distribution – Recurrence Formula of Moments –Moment Generating Function – Additive Property of Binomial Random Variable – Generalization – Mode of the Binomial distribution.	**10**	**CO 3**

	(Chapter 12)		
IV	**Poisson Distribution:** Poisson distribution – Definition – Moments of the Poisson Distribution: Expected Value (Mean) – Variance – Recurrence Formula for Moments – Moment Generating Function – Generalization – Mode of the Poisson distribution. **(Chapter 13)**	**10**	**CO 4**
V	**Normal Distribution:** Definition –Standard Normal Probability Distribution – Moments – Moment Generating Function – Moments about Mean – Linearity Property – Absolute Mean Deviation – Mode – Points of Inflexion – Normal Probability Integral – Properties of Normal Distribution. **(Chapter 16)**	**10**	**CO 5**
Text Book:			
1.	*Vittal, P.R* 2017. **Mathematical Statistic**s**.** Margham Publications, Chennai.		
Reference Books:			
2.	*Gupta, S.P.* 2008. **Statistical Methods.** [Thirty Seventh Edition]. Sultan Chand and Sons, New Delhi.		
3.	*Gupta, S.C.* 2018. **Fundamentals of Mathematical Statistics.** [Eleventh Edition]. S.Chand & Sons, New Delhi.		

COURSE OUTCOMES (CO)

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

CO 1	Learn the importance of statistics
CO 2	Understand the concepts of random variables and mathematical expectations
CO 3	Know the concepts of Binomial distribution
CO 4	Gain knowledge on Poisson distribution
CO 5	Discuss the Normal distribution

20UDSMP301	**CORE PRACTICAL IV: PROGRAMMING IN JAVA**	**SEMESTER - III**

COURSE OBJECTIVES:

The course aims to

- Demonstrate the competency in the use of object oriented programming in Java.
- Utilize Java SDK environment to create, debug and run simple Java programs.

Credits: 2 **Total Hours: 16**

S.No	**PROGRAMS**	**Hrs**	**CO**
1.	Program for Array using Command Line arguments.	**2**	**CO1**
2.	Program using Class and Object.	**2**	**CO1**
3.	Program using Inheritance and Overriding.	**2**	**CO2**
4.	Program for creating User Defined Package.	**2**	**CO2**
5.	Program using Interface concept.	**2**	**CO3**
6.	Program for Exception Handling.	**2**	**CO3**
7.	Program for Multithreading.	**2**	**CO4**
8.	Program using Applet.	**2**	**CO5**

WEB REFERENCES:

1.	http://www.guru99.com/java-tutorial.html
2.	http://java.sun.com
3.	http://www.geeksforgeeks.org

COURSE OUTCOMES (CO):

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

CO1	Build programs using arrays.
CO2	Develop programs using inheritance and overloading.
CO3	Create programs using interfaces and packages.
CO4	Develop programs to handle exceptions.
CO5	Build program using Applets.

20UDSSBP301	**SBC PRACTICAL I: WEB DESIGNING USING HTML, CSS (INTERNAL EVALUATION)**	**SEMESTER - III**

COURSE OBJECTIVES:

The course aims to

- Demonstrate the competency in the use of HTML tags and its attributes.
- Utilize CSS to enhance web pages.

Credits: 2 **Total Hours: 20**

S.No.	**PROGRAMS**	**Hrs**	**CO**
1.	Create a webpage describing your department using paragraph and list tags.	**3**	**CO1**
2.	Create a Table to prepare a class timetable.	**3**	**CO1**
3.	Design a webpage for alumni details using Form tags.	**2**	**CO2**
4.	Create a webpage with frames and Hyperlinks.	**2**	**CO3**
5.	Design a CSS to create menu.	**2**	**CO4**
6.	Design a webpage i.e. Bio data using CSS.	**2**	**CO4**
7.	Create a web page that displays college information using various (font, color etc.)Style sheets.	**3**	**CO5**
8.	Create a web page using following style sheets i. Inline style sheets. ii. Embedded style sheets. iii. External style sheets.	**3**	**CO5**

WEB REFERENCES:

1.	http://www.w3schools.com
2.	http://developer.mozilla.org

COURSE OUTCOMES (CO):

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

CO1	Able to create webpage using paragraph, list and table tags.
CO2	Design a web page using forms.
CO3	Able to design web page using frames and hyperlinks.
CO4	Able to design menus using CSS.
CO5	Create a webpage using various style sheets.

18ULS301	**CAREER COMPETENCY SKILLS – I**	**SEMESTER – III**

COURSE OBJECTIVES:

The course aims to

- Understand the basic needs of Communication.
- Utilize the communication skills for achieving at the time of Interview.

Total Hours: 15

UNIT	**CONTENTS**	**Hrs**	**CO**
I	Basic Grammar – Usage of English – Listening and Speaking (Level-1) Tenses and Voices (Present, Past and Future)	**3**	**CO1**
II	Sentence Correction – Sentence Pattern - Reading Comprehension (Level -1)	**3**	**CO2**
III	Expansion of Proverbs – Closet Test (Level -1)	**3**	**CO3**
IV	Sentence Improvement (Essay Writing, Now- a –Days Vocabulary), Story Writing	**3**	**CO4**
V	E-Mail Building (Sending call letters), Letters (Formal and Informal)	**3**	**CO5**

TEXT BOOKS:

1.	*Anne Seaton, Mew Y. H.* **Basic English Grammar for English-Book 1.**Learners Saddle point Publishers.
2.	*Mark Newson.* **Basic English Syntax with Exercises.** (E-Copy)

REFERENCE BOOK:

1.	*Chand S, Agarwal R. S.* **Objective General English.**Arihant Publications (India) Limited.

COURSE OUTCOMES (CO):

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

CO1	Recall the basic grammar in English.
CO2	Concentrate on Sentence Correction.
CO3	Understand Paragraph Writing.
CO4	Improve the ability of Sentence Construction and Story Writing.
CO5	Format Web Writing and Formal Writing of letters.

18UTALA401	**TAMIL – IV:** சங்க இலக்கியம் - நீதி இலக்கியம்	பருவம் **- IV**

இப்பாடத்திட்டத்தின் நோக்கங்களாவன :

- சங்க இலக்கியம், அற இலக்கியங்களின் சிறப்பைஉணர்த்துதல்.
- இலக்கண நூல்களைகாலவரிசைப்படிஅறியச் செய்தல்.
- அணி இலக்கணத்தின் சிறப்பைஉணரச் செய்தல்.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	எட்டுத்தொகை அ.நற்றிணை–அன்னாய் வாழிப்பத்து (பாடல் எண். 208, 209, 210) ஆ. குறுந்தொகை–யாயும் ஞாயும் (பாடல் எண்.40) இ. கலித்தொகை– ஆற்றுதல் என்பதொன். (பாடல் எண்.103) ஈ. புறநானூறு –பல்சான்றீரேபல்சான்றீரே (பாடல் எண்.195)	**10**	**CO1**
II	பத்துப் பாட்டு அ. குறிஞ்சிப்பாட்டு (1 முதல் 106 அடிகள் வரை) -கபிலர்	**12**	**CO2**
III	அற இலக்கியங்கள் அ. நாலடியார் -பாடல் எண் (35,59,94,141,333) ஆ. நான்மணிக்கடிகை - பாடல் எண் (04,09,59,69,80) இ. பழமொழி-பாடல் எண் (05,21,120,149,361) ஈ. சிறுபஞ்சமூலம் - பாடல் எண் (05,17,48,83,99)	**10**	**CO3**
IV	இலக்கியவரலாறு அ. சங்க இலக்கிய நூல்கள் அறிமுகம் ஆ. முச்சங்கவரலாறு இ. தமிழ் இலக்கண நூல்கள் அறிமுகம் ஈ. அற இலக்கியங்கள் அறிமுகம்	**10**	**CO4**
V	இலக்கணம் அ. அணி இலக்கணம் 1. உவமைஅணி 2. உருவகஅணி 3. வேற்றுமைஅணி 4. வஞ்சப்புகழ்ச்சிஅணி ஆ. அகத்திணைகள்,புறத்திணைகள் - விளக்கம்	**08**	**CO5**

Text Book:	
1	தமிழ்த்துறை வெளியீடு, கே.எஸ்.ரங்கசாமி கலைஅறிவியல் கல்லூரி (தன்னாட்சி), திருச்செங்கோடு– 637 215.

COURSE OUTCOMES (CO)

இப்பாடத்தைக் கற்பதன் வாயிலாக மாணவர்கள் பெறும் பயன்களாவன:

CO1	எட்டுத்தொகை நூல்களின் சிறப்பை அறிதல்
CO2	பத்துப்பாட்டு நூல்களின் சுவை அறிதல்
CO3	அற இலக்கியங்கள் பற்றிஅறிதல்
CO4	இலக்கியங்கள் தோற்றமுறையை அறிதல்
CO5	அணி இலக்கணத்தின் பயன் பற்றிஅறிதல்.

18UENLA401	FOUNDATION ENGLISH – IV	SEMESTER – IV

COURSE OBJECTIVES:

The course aims to

- Promote communication skills through literature.
- Enhance the language learning through activities.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I & II	**ONE ACT PLAY** Monica Thorne - The King Who Limped **PROSE** A.G.Gardiner - On Shaking Hands **GRAMMAR** Punctuation **COMPOSITION** Hints Development **COMMUNICATION SKILLS** Breaking the Law Honoring the Person	20	CO1 & CO2
III & IV	**ONE ACT PLAY** Ella Adkins – The Unexpected **PROSE** Minoo Masani - No Man is an Island **GRAMMAR** Conditional Clause **COMPOSITION** Report Writing **COMMUNICATION SKILLS**	20	CO3 & CO4
	Brain Storming		
V	**PROSE** Arnold Toynbee - India's Contribution to World Unity **GRAMMAR** Simple, Compound and Complex Sentences **COMPOSITION** Jumbled Sentence **COMMUNICATION SKILLS** Role-Play	10	CO5

Text Books:	
1	*Ramamurthy.*K.S. 1984. **Seven-Act Plays**. Published in India by Oxford University. New Delhi–110 001.
2	*Damodar.G, D.Venkateshwarlu, M.Narendra, M.SaratBabu, G.M.Sundaravalli. 2009*. **English For Empowerment**. Published by Orient Blackswan Private Limited. Hyderabad –500 029.
3	*SasiKumarV and SyamalaV*. 2006. **Form and Function - A Communicative Grammar for Colleges.** Emerald Publishers. Chennai–600 008.
4	*Farhathullah.T.M.* 2006. **Communication Skills for Undergraduates**. RBA Publications. Chennai–600 015.
Reference Books:	
1	*Raymond Murphy*. 1994. **Intermediate English Grammar.** Cambridge University India Pvt. New Delhi.

COURSE OUTCOMES (CO)

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

CO1	Understand the text on the basis of close reading analytically and critical views.
CO2	Ability to construct a sustained sophisticated and original argument on a specific topic.
CO3	Acquire language skills through composition.
CO4	Acquire both composition and communication skills.
CO5	Apply basic communication skills.

20UDSM401	CORE VII: PROGRAMMING IN .NET (VB.NET & ASP.NET)	SEMESTER - IV

COURSE OBJECTIVES:

The course aims to

- Develop the knowledge of creating Web Applications using VB.NET and ASP.NET.
- Improve the skill of developing Database applications using ADO.NET.

Credits: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**The .NET Platform and the Web:** The path way to Web Applications-The Web Client/Server Model: Web Clients and Web Servers – Protocols for Web Client/Server Communication – Server-Side Processing with CGI Programs – Disadvantages of Using CGI. Components of ASP.NET and the .NET Framework-Overview of Internet Information Server: ISAPI Extensions – ISAPI Filters. Overview of ASP.NET: Web Forms. The .NET Common Language Runtime and Class Library. Managed Components in .NET- Web Services- Language Independence in the .NET Framework-COM+ Component Services and .NET-Direction and Plans for .NET. **TheVB.NET Crash Course:** What is VB.NET? -Hello World (Yet Again): Your First VB Application. Variables, Constants and Operators: Variable Types – Declaring and Assigning Variables – Scope and Lifetime of Variables – Arrays – Converting Data Types – Using Constants – Arithmetic and Comparison Operators. Modularizing Your Code-Function and Subroutines: Using Functions – Using Subroutines. Controlling Program Flow: Conditional Processing – Flow Control Statements - Loops.	10	CO1

II	**TheVB.NET Crash Course:** Handling Errors and Exceptions: Unstructured Error Handling – Structured Exception Handling. Object Oriented Programming: Class Basics – ClassProperties – Constructors and Destructors – Inheritance-Overridden Functions – Overloading – Polymorphism Overview – Interfaces-Implementing Polymorphism by using Interfaces. Multithreaded Programming: Thread Synchronization – Events and Thread Synchronization.	**10**	**CO2**
III	**Working with ASP.NET**: The Features of ASP.NET- The Anatomy of ASP.NET pages: The code Structure of ASP.NET – Execution Stages and State Management – The Events Model for the Page Class. Introducing Web Forms-VS.NET Web Applications and Other IDE Basics - Separating Content and Code–the Code-Behind Feature-Application Configuration: Structure and Configuration of the Global.asax File. Using HTML Controls: The HTMLForm Control – The HTMLAnchor Control – The HTMLButton Control – The HTMLGenericControl Control – The HTMLImage Control – The HTMLInputButton Control – The HTMLInputCheckBox Control – The HTMLInputFile Control – The HTMLInputHidden Control – The HTMLInputImage Control –The HTMLInputRadioButtonControl – The HTMLInputTextControl – The HTMLSelect Control – The HTMLTable, HTMLTableCell, and HTMLTableRow Controls – The HTMLTextArea Control. Using Web Controls: Shared Web Control Properties.Web Controls for Displaying and Formatting Data: The Label Control – The Panel Control – The Table, TableRow, and TableCell Controls. Web Controls for Creating Buttons: The Button Control – The ImageButton Control – The	**10**	**CO3**

	LinkButton Control – Demonstration of Web Button Controls. Web Control for Inputting Text: The TextBox Control. Web Controls for selecting Choices: The CheckBox Control – The RadioButton Control –The CheckBoxList and RadioButtonList Controls. Web Controls for Creating Lists: The ListBox Control – The DropDownList Control.		
IV	**Working with ASP.NET:** Miscellaneous Basic Controls: The Hyper Link Control-The Image Control. Creating a Simple ASP.NET Application:YourFirst ASP.NET Project.ASP.NET Page Directives: The @ Page and @ Control Directives – The @ Import Directive – The @ Register Directive – The @ Assembly Directive – The @ OutputCache Directive. ASP.NET Rich Controls: The Calendar Control – AdRotatorControl.Validation Controls: The BaseValidator Control–The RequiredFieldValidator Control – The CompareValidator Control – The RangeValidator Control – The RegularExpressionValidator Control – CustomValidator Control. Data List Controls: The Repeater Control-The DataGrid Control-The DataList Control.	**11**	**CO4**
V	**Accessing Data with ADO.NET:** Overview of Data Access on the Web: Flat Files – Legacy or Mainframe Data – Proprietary Database APIs – Standard APIs – ADO. ADO.NET: The Next Generation of Data Access Technology-ADO.NET Programming Objects and Architecture: The DataSet Class – The .NET Managed Data Provider. Displaying Database Data: The IDataReader Interface (System.Data.IDataReader) – Working with Command Parameters – The DataGrid Control Revisited – Displaying Data in the DataGrid Control – Editing Data in the DataGrid Control. Programming with the DataList and DataGrid Controls: An	**9**	**CO5**

	Online Photo Gallery. Working with the Dataset and DataTableObjects: The DataSet Class Summary – The DataTable Class Summary – Creating DataSet and DataTable Objects – Adding Data to a DataTable Object – Displaying Data in a DataTable Object – Loading and Updating DataSet Objects with the IDataAdapter Interface – Filtering and Sorting Data with the DataView Class.		

TEXT BOOK:

1.	*Matt Crouch. J.* 2006. **Asp.Net and Vb.Net Web Programming.** [First Impression 2006]. Pearson Education, India.

REFERENCE BOOKS:

1.	*Damien Foggon and Daniel Maharry.* 2005. **Beginning Asp.Net 1.1 Databases: From Novice To Professional.** [First Indian Reprint]. Apress, USA.
2.	*William B.Sanders.* 2009. **Asp.Net 3.5**[Second Edition]. Tata McGraw-Hill Publication, New Delhi.
3.	*Jeffrey Shapiro, R.* 2002. **The Complete Reference Visual Basic .Net.** [Tata McGraw Hill Edition]. Tata McGraw Hill, New Delhi.
4.	*Steven Holzner*. 2008. **Visual Basic .Net Programming Black Book**. [New Edition]. Dreamtech Press, New Delhi.

WEB REFERENCES:

1.	https://www.tutorialspoint.com/vb.net/
2.	https://www.vbtutor.net/index.php/visual-basic-net-tutorials/
3.	https://www.guru99.com/asp-net-tutorial.html

COURSE OUTCOMES (CO)

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

CO1	Describe the basic structure of a VB.NET and apply main features of the Integrated Development Environment (IDE).
CO2	Understand exception handling mechanisms and the elements of OOPs concepts.
CO3	Understand the usage of HTML controls in web form.
CO4	Attain knowledge on utilizing the validation controls.
CO5	Translate general requirements into data-related solutions using database concepts for real time applications.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	M	M
CO2	H	H	H	H	H
CO3	H	H	M	H	H
CO4	H	H	H	H	M
CO5	H	H	H	H	M

H-High; M-Medium; L-Low

20UDSM402	CORE VIII: RELATIONAL DATABASE MANAGEMENT SYSTEMS	SEMESTER - IV

COURSE OBJECTIVES:

The course aims to

- Know the fundamentals of Database Management.
- Apply the techniques of normalization in the database table.
- Understand query optimization.

Credits: 3 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Introduction to Database Management Systems:** Information-Data and Data Management-File Based Data Management – Database Systems –Organization of a Database-Characteristics of Data in a Database-Database Management System- Functions of DBMS. Components of DBMS: Data Dictionary –Database Users. **Database Architecture and Design:** Database Architecture – Data Abstraction – Physical and Logical Data Independence – Database Languages – Database Design-Design Constraints.	**10**	**CO1**
II	**Data Models**: Introduction-Relational Model – Object-oriented Model. **Entity-Relationship (E-R) Modeling:** E-R Model – Components of an E-R Model – E-R Diagram Conventions – Relationships-Composite Entities-Entity List-E-R Diagram (ERDS). **Relational Database Management Systems (RDBMS):**Introduction - RDBMS Terminology – Relational Data Structure. **Relational Data Integrity and Database Constraints:** Integrity Constraints. **Data Normalization:** Pitfalls in Relational Database Design -Decomposition – Functional Dependencies – Normalization – Keys-Relationships – First Normal Form (1NF) – Second Normal Form (2NF) – Third Normal Form (3NF) - Boyce-	**10**	**CO2**

	Codd Normal Form (BCNF) -Fourth Normal Form (4NF) -Fifth Normal Form (5NF) -Denormilization.		
III	**Relational Algebra:**Introduction - Relational Algebraic Operations – Aggregate Functions – Update Operations.**Structured Query Language (SQL):**Introduction - Characteristics of SQL – Advantages of SQL – Types of SQL Commands – SQL Operators – Arithmetic Operators – Comparison Operators – Logical Operators – Set Operators. **Tables, Views and Indexes:** Tables**–** Views – Indexes.**Queries and Subqueries:** Queries – Subqueries. **Aggregate Functions:** Introduction-General Rules-COUNT()and COUNT(*)-SUM()-AVG()-MAX()and MIN(). **INSERT UPDATE and DELETE Operations:** Insert Statement-Update Statement-Delete Statement.	**10**	**CO3**
IV	**Files, File Organization and File Structures:** Introduction-Operations on Files – File Storage Organization – Physical Storage Media – Storage Access – Buffer Manager - File Organization - File Structure – Record Types. **Indexing and Hashing:** Introduction – Indexing: Ordered Indexes. Hashing.	**10**	**CO4**
V	**Transaction Management and Concurrency Control:** Introduction**-**Transactions – Transaction Properties(ACID Properties) –Transaction States – Concurrency Control – Serializability – Recoverability – Concurrency Control Schemes – Transaction Management in SQL – Transactions and Recovery – User-defined Transactions – The COMMIT command - The ROLLBACK Command – The SAVEPOINT Command.	**10**	**CO5**
TEXT BOOK:			
1.	*Alexis Leon and Mathews Leon.* 2009. **Essentials of Database Management**		

	Systems. Vijay Nicole Imprints Private Limited, Chennai.
REFERENCE BOOKS:	
1.	*P.K Yadav.2013.* **An Introduction to Database Systems.** S.K Kataria& Sons.
2.	*Raghu Ramakrishnan and Johannes Gehrke.* 2014. **Database Management Systems.** [Third Edition]. Tata Mc-GrawHill, New Delhi.
WEB REFERENCES:	
1.	https://www.tutorialspoint.com/dbms
2.	https://www.guru99.com/what-is-dbms.html
3.	https://www.studytonight.com/dbms/overview-of-dbms.php

COURSE OUTCOMES(CO):

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

CO1	Understand the basic concepts of database.
CO2	Aware of logical design and Data Normalization.
CO3	Understand basics of SQL and effective query building concepts.
CO4	Familiar with basic database storage structures and access techniques.
CO5	Gain knowledge on Transaction Management.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	M	M
CO2	M	H	H	H	H
CO3	M	H	H	M	M
CO4	M	H	H	H	H
CO5	M	M	M	M	H

H-High; M-Medium; L-Low

20UMADSA401	ALLIED IV: OPERATIONS RESEARCH	SEMESTER – IV

COURSE OBJECTIVE:

The Course aims to

- Describe the industrial problems in terms of mathematical modeling and find the solution to the problem.

Credits: 4 **Total Hours: 40**

UNIT	CONTENTS	Hrs.	CO
I	**Linear Programming Formulation and Graphical Method:** Introduction - Requirements for employing LPP technique – Mathematical Formulation of L.P.P. - Basic assumptions - Graphical method of the Solution of a L.P.P. – Some more cases – Advantage of Linear Programming – Limitations of Linear Programming.	08	CO 1
II	**Transportation Model:** Introduction - Mathematical formulation of a transportation problem - Methods for finding initial basic feasible solution – Transportation algorithm or MODI method – Degeneracy in Transportation problems – Unbalanced Transportation Problems – Maximization case in Transportation problems. **(Chapter – 7 Sections: 7.1 – 7.5)**	08	CO 2
III	**Assignment Problem:** Introduction – Mathematical formulation of an Assignment Problem –Difference between the Transportation Problem and Assignment Problem – Assignment Algorithm or Hungarian Method – Unbalanced Assignment Models – Maximization case in Assignment Problems.	08	CO 3

	(Chapter – 8 Sections: 8.1 – 8.2, 8.4 - 8.7)		
IV	**Scheduling by PERT and CPM:** Introduction – Basic Terminologies – Rules for constructing a project network – Network computations – Floats – Programme Evaluation Review Technique (PERT) – Basic differences between PERT and CPM. **(Chapter – 15 Sections: 15.1 – 15.7)**	**08**	**CO 4**
V	**Game Theory:** Introduction – Two person zero-sum games – The Maximin-Minimax Principle – Games without Saddle points, Mixed strategies – Dominance property - Graphical method for 2 x n or m x 2 games. **(Chapter - 16 Sections: 16.1 – 16.4, 16.6 – 16.7)**	**08**	**CO 5**
TEXT BOOK:			
1.	*Sundaresan,V., Ganapathy Subramanian, K.S. and Ganesan, K.* 2014. **Resource Management Techniques**. [Eighth Edition]. AR Publication, Chennai.		
REFERENCE BOOKS:			
1.	*KantiSwarup, Gupta, P.K. and Man Mohan.* 2014. **Operations Research.** [Seventeenth Edition]. Sultan Chand & Sons, New Delhi.		
2.	*Gupta, P.K. and Hira. D.S.* 2004. **Operations Research.** [Eighth Edition]. S.Chand and Company, New Delhi.		

COURSE OUTCOMES (CO):

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

CO 1	Formulate and solve real life problems through LPP
CO 2	Calculate the optimum transportation schedule
CO 3	Find the optimum assignment model
CO 4	Use the techniques for planning and scheduling of projects
CO 5	Identify the optimum strategies in business

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	M	M	H	M	M
CO 2	M	M	H	M	M
CO 3	M	M	H	M	M
CO 4	M	M	H	M	M
CO 5	M	M	H	M	M

H-High; M-Medium; L-Low

20UDSMP401	**CORE PRACTICAL V: PROGRAMMING IN .NET**	**SEMESTER - IV**

COURSE OBJECTIVES:

The course aims to

- Understand the usage of tools and techniques.
- Familiarize Structured Query Language.

Credits: 2 **Total Hours: 20**

S.No	PROGRAMS	Hrs	CO
1.	Designing a Simple Calculator using VB.NET	**3**	**CO1**
2.	Developing a Timer Based Quiz using VB.NET	**2**	**CO1**
3.	Writing a VB.NET Program to Handle Exceptions and Implement Overloading.	**2**	**CO2**
4.	Performing different types of Validation Controls using ASP.NET	**2**	**CO3**
5.	Creating a Database connection and perform Insert, Delete, View and Update records in VB.NET	**2**	**CO3**
6.	Establishing Database connection for binding Student Database through Repeater Control using ASP.NET	**3**	**CO4**
7.	Writing an ASP.NET Program for Storing, Retrieving and Manipulating Students Mark Statement.	**3**	**CO5**
8.	Writing an ASP.NET Program to handle the Integrity and Referential Integrity constraints in Column and Table Level.	**3**	**CO5**

WEB REFERENCES:	
1.	https://www.tutorialspoint.com/vb.net/vb.net_web_programming.htm
2.	https://www.w3schools.com/asp/webpages_examples.asp
3.	https://www.guru99.com/what-is-dbms.html

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Understand the tools in .NET.
CO2	Improve the logical ability for developing program.
CO3	Create and manipulate Database.
CO4	Connect the backend with the frontend.
CO5	Maintain the data consistency.

20UDSSBP401	**SBC PRACTICAL II: JAVASCRIPT (INTERNAL EVALUATION)**	**SEMESTER - IV**

COURSE OBJECTIVES:

The course aims to

- Understand the structure of an HTML document, HTML elements and attributes with JavaScript
- Explore the knowledge of fundamental concepts of Java Script such as arrays, function, objects, repetition, constructors, error handling and etc.
- Explore the Program interaction with web pages by JavaScript.

Credits: 2 **Total Hours: 20**

S.No.	**PROGRAMS**	**Hrs**	**CO**
1.	Finding a Factorial Number Using JavaScript.	**3**	**CO1**
2.	Popup Messages Using Event Function in JavaScript	**3**	**CO2**
3.	Frames Using Java Script	**2**	**CO1**
4.	Creating Forms Using JavaScript	**2**	**CO4**
5.	Validating User Input Form using JavaScript	**2**	**CO3**
6.	Looping statement through an array using JavaScript	**2**	**CO2**
7.	Error Handling in JavaScript	**3**	**CO5**
8.	Creating a dynamic Websites using JavaScript	**3**	**CO5**

REFERENCE BOOK:

1.	Programming JavaScript Applications: Robust Web Architecture with Node, HTML5, and Moderns JS Librariesby Eric Elliott

WEB REFERENCES:

1.	https://www.javascript.com
2.	https://www.w3schools.com
3.	https://www.guru99.com/practical-code-examples-using-javascript.com

COURSE OUTCOMES (CO)

After completion of the course, the student will be able to:

CO1	Understand the basic concepts of HTML and JavaScript.
CO2	Implement interactive web pages using HTML and JavaScript.
CO3	Perform online validation in forms.
CO4	Apply a structured approach to identify the needs, interests and functionality of a website.
CO5	Build Dynamic Website using JavaScript.

18ULS401	CAREER COMPETENCY SKILLS – II	SEMESTER – IV

COURSE OBJECTIVES:

The course aims to

- Impart knowledge on the aptitude skills.
- Enhance employability skills and to develop career competency.

Total Hours: 15

UNIT	CONTENTS	Hrs	CO
I	Aptitude: Speed Maths - Multiplication of Numbers - Simplification - Squaring of numbers - Square roots and cube roots – HCF&LCM –Decimals-Averages, Powers and Roots.	3	CO1
II	Aptitude: Problems on Numbers – Problems on Ages – Surds & Indices – Percentage – Profit & Loss – Ratio & Proportion – Partnership – Chain Rule.	3	CO2
III	Aptitude: Simple & Compound Interest – Alligation or Mixture - Permutation and Combination.	3	CO3
IV	Aptitude: Probability – Missing Number series – Wrong Number Series –Races & Games of Skill.	3	CO4
V	Aptitude: Time & Work – Pipes & Cistern – Time & Distance – Problems on Trains – Boats and Streams.	3	CO5

TEXT BOOK:

1.	*R.S. Aggarwal.*2017.**Quantitative Aptitude**, *S Chand and Company Limited, New Delhi.*

REFERENCE BOOK:

1.	*AbhijithGuha.*2015. **Quantitative Aptitude for Competitive Examinations**, *5th Edition, Tata McGraw Hill,New Delhi.*

COURSE OUTCOMES (CO)

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

CO1	Carry out mathematical calculations using shortcuts.
CO2	Calculate problems on age, surds and indices with shortcuts.
CO3	Understand the core concepts of SI and CI, Permutation and Combination.
CO4	Obtain knowledge on shortcuts to calculate number series.
CO5	Perform new methods for aptitude calculations.

20UDSM501	**CORE IX: DATA MINING AND WAREHOUSING**	**SEMESTER - V**

COURSE OBJECTIVES:

The course aims to

- Build Fundamental and Research aspects of Data Mining.
- Understand implementation of Mining Algorithms on various Applications.

Credit Points: 5 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Introduction:** Motivation – Data Warehousing and Data Mining Technologies - Data Models - Data Warehousing and OLAP: User's Perspective – Data Mining: User's Perspective-Related Disciplines. **Frequent Pattern Mining**: Basic Problem Definition-Mining Association Rules - Applications-Variations-Interestingness-Frequent Item set Mining (FIM) Algorithms.	**10**	**CO1**
II	**Classification:** Basic Problem Definition – Applications - Evaluation of classifiers - Other issues - Classification Techniques - Optimal Classification Algorithms.	**10**	**CO2**
III	**Clustering:** Basic Problem Definition - Clustering Applications - Measurement of Similarity - Evaluation of Clustering Algorithms - Classification of Clustering Algorithms - Partitioning Methods - Hierarchical Methods - Density based Methods - Grid-Based methods.	**10**	**CO3**
IV	**Pattern Discovery in Real-World Data:** Relational Data-Transactional Data-Multi-Dimensional Data-Distributed Data-Spatial Data-Data Streams-Time-Series Data-Text and Web Data.	**10**	**CO4**
V	**Data Warehousing: The Data Model:** Fundamentals - Data Warehouse Data Characteristics - Data Warehouse Components - Approaches to Build Data Marts and Data Warehouse – ETL -	**10**	**CO5**

	Logical Data Modeling - More on Dimensional Modeling - OLAP.		
TEXT BOOKS:			
1.	*VikramPudi and Radha Krishna, P.* 2010**. Data Mining.** [Third Impression]. Oxford University Press, New Delhi.		
REFERENCE BOOKS:			
1.	*Jiawei Han and MichelineKamber***.** 2006. **Data Mining Concepts and Techniques.** [Second edition].Morgan Kaufmann Publishers an Imprint of Elsevier, New Delhi.		
2.	*Arun, K.Pujari.* 2007. **Data Mining Techniques.** [Eleventh Impression]. Universities Press Private Limited, Hyderabad.		
3.	*Soman, K. P, ShyamDiwaka, and Ajay, V.*2006. **Insight into Data Mining: Theory and Practice.** [Second Printing].Prentice-Hall of India Private Limited, New Delhi.		
WEB REFERENCES:			
1.	https://www.guru99.com/datamining		
2.	https://www.tutorialspoint/dwh		

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of Data Warehousing and Pattern Mining.
CO2	Acquire knowledge about problem definition.
CO3	Understand the concepts of Algorithm and its method.
CO4	Know the concepts of pattern discovery in data.
CO5	Gain knowledge of data models.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UDSM502	**CORE X: SOFTWARE ENGINEERING**	**SEMESTER - V**

COURSE OBJECTIVES:

The Course aims to

1. Analyze Software Development Life Cycle.
2. Apply Software Design principles for real time applications.

Credit Points: 5 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Software Engineering Fundamentals - Software processes: Software life - cycle and process models - Process assessment models - Overview of Project Management activities. Software requirements and specifications – Requirement Elicitation- Requirements analysis modeling techniques- Functional and nonfunctional requirements - User requirements, System requirements, requirement validation and software requirement specification document.	**10**	**CO1**
II	Fundamental design concepts and principles-Design characteristics - System Models-Context, Behavioral, Data and, Object models - Architectural design - System structuring, Control models, Structured design - Object-oriented analysis and design - User interface design	**10**	**CO2**
III	Validation planning - Testing fundamentals - Test plan Creation and test case generation - Black-box and white-box testing techniques, Unit testing, Integration, validation, and system testing – Object -	**10**	**CO3**

	oriented testing.		
IV	Software Evolution - Software maintenance, Characteristics of maintainable software - Reengineering	**10**	**CO4**
V	Team management, Role identification and assignment, Project tracking, Team problem resolution; Software measurement and estimation techniques. Software quality assurance - Software configuration management Overview of SEICMM, ISO 9000, CMMI, PCMM, TQM and Six Sigma- Overview of CASE tools. Software tools and environments.	**10**	**CO5**

TEXT BOOKS:	
1.	*Ian Sommerville*. 2013. **Software Engineering**. [Ninth Edition]. Pearson.
REFERENCE BOOKS:	
1.	*R. S. Pressman*. 2014. **Software Engineering- A Practitioner's Approach**, [Eighth Edition]. McGraw Hill Higher Education.
WEB REFERENCES:	
1.	https://www.geeksforgeeks.org/software engineering
2.	https://www.javatpoint.com/software-engineering-tutorial
3.	https://www.tutorialspoint.com/software engineering

COURSE OUTCOMES (CO):

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

CO1	Understand the concepts of process, product and project development.
CO2	Acquire the knowledge of requirement analysis.
CO3	Understand the knowledge of software design and testing.
CO4	Know the basics of software maintenance.
CO5	Gain knowledge about project management techniques.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	H
CO2	H	M	H	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	M	H

H-High; M-Medium; L-Low

20UDSM503	CORE XI: OPERATING SYSTEMS	SEMESTER – V

COURSE OBJECTIVE:

The course aims to

- Learn the fundamentals of Operating Systems.
- Know the components of memory management aspects and security.

Credit Points: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Overview: Introduction: C**omputer - System Organization - Computer System Architecture – Operating System Structure - Operating System operations - Process Management - Memory Management - Storage Management - Protection and Security. **Operating-System Structures:** Operating - System Services - Types of System Calls - System Programs – Operating-System Design and Implementation – Operating-System Structure. **Process Management**: **Processes:** Process Concept - Process Scheduling - Interprocess Communication.	**10**	**CO1**
II	**Threads:** Multithreading Models. **Process Synchronization: C**ritical-Section Problem – Semaphores – Classical Problems of Synchronization. **CPU Scheduling:** Basic Concepts - Scheduling Criteria and Algorithms. **Deadlocks**: Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention, Avoidance and Detection - Recovery from Deadlock.	**10**	**CO2**

III	**Memory Management: Main Memory:** Background – Segmentation – Paging -- Structure of the Page Table. **Virtual Memory:** Demand Paging - Page Replacement - Thrashing.	**10**	**CO3**
IV	**Storage Management**: **Mass - Storage Structure:** Disk Structure – Disk Scheduling – RAID Structure. **File-System Interface:** File Concept - Access Methods - Directory and Disk Structure - Protection. **File-System Implementation:** Allocation Methods - Free-Space Management. **I/O Systems**: Kernel I/O Subsystem.	**10**	**CO4**
V	**Protection and Security: Protection:** Domain of Protection - Access Matrix - Implementation of the Access Matrix**. Security:** The Security Problem - Program Threats - System and Network Threats - User Authentication - Firewalling to Protect Systems and Networks. **Case Study**: Windows 7, Android (Open Source): Android Overview.	**10**	**CO5**
TEXTBOOKS:			
1	*Abraham Silberschatz, Peter Baer Galvin and Greg Gagne*. 2013. **Operating System Concepts.** [Ninth Edition]. Wiley Edition.		
2	*Marko Gargenta, Masumi Nakamura. 2014. Learning Android.[Second Edition].O'Reilly,USA.[**Case study**: Android (open source) – Unit V]*		
REFERENCE BOOKS:			
1	*William Stallings*. 2004. **Operating Systems – Internals & Design Principles.** [Fifth Edition]. Prentice – Hall of India Pvt. Ltd., New Delhi. Prentice – Hall of India P.Ltd., New Delhi.		
2	*Andrew Tannenbaum*, S.2011. **Modern Operating Systems.** [Third Edition].Prentice-Hall of India,New Delhi.		

WEB REFERENCES:	
1	https:// www.os-book.com
2	http://www.geeksforgeeks.org
3	http://www.tutorialspoint.com
4	https://www.w3schools.in

COURSE OUTCOMES (CO):

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

CO1	Analyze the structure of OS and process management.
CO2	Analyze and design the application to run thread model of operating systems.
CO3	Understand the concepts of paging.
CO4	Attain knowledge on files and storage management.
CO5	DescribeProtection and Security concepts.

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	M	M	M
CO2	H	H	M	M	H
CO3	H	H	H	H	H
CO4	M	H	H	H	H
CO5	H	H	H	M	H

H-High; M-Medium; L-Low

20UDSEL501	ELECTIVE I: SOCIAL MEDIA MINING	SEMESTER - V

COURSE OBJECTIVES:

The Course aims to

- Understand how accurately analyze voluminous complex data set in social media and other sources.
- Understand the models and algorithms to process large data sets.
- Understand social behavior and recommendation challenges and methodologies.

Credit Points: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Social Media Mining - Introduction – Atoms – Molecules – Interactions – Social Media mining Challenges - Graphs - Basics – Nodes – Edges – Degree of Distribution - Types – Directed – Undirected – Weighted - Graph Connectivity - Tress and Forests – Bipartite graphs – Complete Graphs – Sub graphs – Planar Graphs - Graph Representation - Graph Traversal Algorithms – Shortest path algorithms Dijkstra‟s - Spanning tree algorithms – Prims - Bipartite matching - Ford-Fulkerson algorithm.	**10**	**CO1**
II	Network Models – Measures – Node : Eigen Centrality – Page Rank – Group Measures – Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient – Jaccard - Case Study: Modeling small networks with real world model.	**10**	**CO2**
III	Social media Communities – Social Communities – Member based Detection – Node degree – Node Similarity – Node reachability - Group Based detection methods - balanced –	**10**	**CO3**

	robust - modular – dense - hierarchical - Spectral Clustering: Balanced Community algorithm Community Evolution - Evaluation.		
IV	Social Network – Information Diffusion – Types - herd behavior - information cascades diffusion of innovation – epidemics – Diffusion Models Case Study – Herd Behavior – Information Cascades Methods – Social Similarity – assortativity – Social Forces - Influence homophily – Confounding - Assortativity measures – Influence measures – Predictive Models.	**10**	**CO4**
V	Recommendation Vs Search – Recommendation Challenges – Recommender algorithms - Content-Based Methods - Collaborative Filtering – Memory Based – Model Based – Social Media Recommendation – User friendship – Recommendation Evaluation – Precision – Recall –Behavioral – User Behavior – User – Community behavior – User Entity behavior – Behavioral Analytics – Methodology.	**10**	**CO5**
TEXT BOOKS:			
1.	*Reza Zafarani, Mohhammad AbiElasi. 2014.* **Social Media Mining: An Introduction**. Cambridge press.		
REFERENCE BOOKS:			
1.	*Memon, N., Xu, J.J., Hicks, D.L., Chen, H. (Eds.).* **Data Mining for Social Network Data.**		
WEB REFERENCES:			
1.	http://dmml.asu.edu/smm/chapter		
2.	http://learn.g2.com		

COURSE OUTCOMES (CO):

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

CO1	Understand the concepts of Graph Models, social communities.
CO2	Understand the network models and measures to evaluate information.
CO3	Understand and apply algorithms to model data using graph and network structures and recommendations.
CO4	Apply algorithms on social data diffusion for various domains.
CO5	Distinguish and Suggest the appropriate algorithms for domain specific applications for data modeling.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UDSEL502	**ELECTIVE I: NATURAL LANGUAGE PROCESSING**	**SEMESTER - V**

COURSE OBJECTIVES:
The Course aims to

- Make students understand syntactic and semantic elements of natural language processing.
- Conceive basics of knowledge representation and inference.

Credit Points: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**INTRODUCTION:** Applications of NLP techniques and key issues - MT – grammar checkers – dictation - document generation - NL interfaces - Natural Language Processing key issues - The different analysis levels used for NLP: morpho-lexical - syntactic – semantic - pragmatic - markup (TEI, UNICODE) - finite state automata - Recursive and augmented transition networks – open problems.	**10**	**CO1**
II	**LEXICAL LEVEL:** Error-tolerant lexical processing (spelling error correction) - Transducers for the design of morphologic analyzers Features - Towards syntax: Part-of-speech tagging (Brill, HMM) – Efficient representations for linguistic resources (lexica, grammars,..) tries and finite – state automata.	**10**	**CO2**
III	**SYNTACTIC LEVEL:** Grammars (e.g. Formal/Chomsky hierarchy, DCGs, systemic, case, unification, stochastic) - Parsing (top-down, bottom-up, chart (Earley algorithm), CYK algorithm) - Automated estimation of probabilistic model parameters (inside-outside algorithm) - Data Oriented Parsing - Grammar formalisms and treebanks -	**10**	**CO3**

	Efficient parsing for context-free grammars (CFGs) - Statistical parsing and probabilistic CFGs (PCFGs) - Lexicalized PCFGs.		
IV	**SEMANTIC LEVEL:** Logical forms – Ambiguity resolution - Semantic networks and parsers - Procedural semantics - Montague semantics - Vector Space approaches - Distributional Semantics - Lexical semantics and Word Sense Disambiguation - Compositional semantics. Semantic Role Labeling and Semantic parsing. **PRAGMATIC LEVEL:** Knowledge representation – Reasoning - Plan/goal recognition - speech acts/intentions - belief models - discourse – reference.	**10**	**CO4**
V	**NATURAL LANGUAGE GENERATION:** content determination - sentence planning – surface realization. **SUBJECTIVITY AND SENTIMENT ANALYSIS:** Information extraction – Automatic summarization Information retrieval and Question answering - Named entity recognition and relation extraction - IE using sequence labeling - Machine translation: Basic issues in MT - Statistical translation - word alignment - phrase-based translation and synchronous grammars.	**10**	**CO5**
TEXT BOOKS:			
1.	*Daniel Jurafsky and James H. Martin*.2009. **Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition**. Prentice Hall.		
2.	*Ian H. Witten and Eibe Frank, Mark A. Hall*.2013. **Data Mining: Practical Machine Learning Tools and Techniques**, Morgan Kaufmann.		

REFERENCE BOOKS:	
1.	*Christopher Manning and Hinrich Schütze*. 2008. **Foundations of Statistical Natural Language Processing**. MIT Press.
2.	*James Allen*.1995.**Natural Language Understanding**. Addison Wesley, 1995.
3.	*Steven Bird, Ewan Klein, and Edward Loper.2009.* **Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit.** O'Reilly Media, Sebastopol.

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of natural language.
CO2	Acquire knowledge about lexical level.
CO3	Understand the concepts of syntactic level.
CO4	Know the concepts of semantic and pragmatic level.
CO5	Gain knowledge of sentiment analysis.

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UDSMP501	**CORE PRACTICAL VI: R PROGRAMMING**	**SEMESTER - V**

COURSE OBJECTIVES:

The Course aims to

- Provide the knowledge of vector based calculation.
- Develop R programs using looping constructs and R Mathematical functions that can be used for data exploration in R.

Credit Points: 2 **Total Hours: 24**

S. No.	CONTENTS	Hrs	CO
1.	Creating and manipulating a vector.	**3**	**CO1**
2.	Program to get Fibonacci numbers.	**3**	**CO1**
3.	Creating matrix and manipulating matrix.	**3**	**CO2**
4.	Comparison of matrix and vectors.	**3**	**CO2**
5.	Program on branching statements.	**3**	**CO3**
6.	Program on looping statements.	**3**	**CO3**
7.	Operations on lists.	**3**	**CO4**
8.	Creating and saving graphs to files.	**3**	**CO5**

WEB REFERENCES:

1.	https://www.coursera.org/learn/r-programming
2.	https://coupontry.wordpress.com/2018/04/r-programming-a-z-r-for-data-science-with-r-real-exercises-learn-r-programming-from-scratch
3.	https://rstudio.com

COURSE OUTCOMES (CO):

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

CO1	Understand the concepts of descriptive statistics.
CO2	Gain the knowledge on matrix manipulations.
CO3	Develop programs using control structures.
CO4	Apply computational techniques.
CO5	Learn exploratory data analysis.

20UDSMP502	**CORE PRACTICAL VII: COMPUTER HARDWARE**	**SEMESTER - V**

COURSE OBJECTIVES:

The course aims to

- Acquire the knowledge of computer hardware components.
- Develop the knowledge of computer peripherals.

Credit Points: 2 **Total Hours: 24**

S.NO	**PROGRAMS**	**Hrs**	**CO**
1.	Identification of various Components, External Ports and Interfacing.	**3**	**CO1**
2.	Assembling a PC.	**3**	**CO1**
3.	Disassembling a PC.	**3**	**CO1**
4.	Upgrading the System Components a. Adding New Memory b. Adding new graphics card.	**3**	**CO2**
5.	Installing Windows Operating System in VMWare.	**3**	**CO2**
6.	Installing Application Software's and Utilities a. MS Office b. Anti-Virus.	**3**	**CO3**
7.	Installing LINUX (Red Hat LINUX) in VMWare .	**3**	**CO4**
8.	Creating Users, Groups and Basic File Operations and mounting CD – ROM.	**3**	**CO5**

WEB REFERENCES:

1.	http://courses.lumenlearning.com
2.	http://www.tutorialspoint.com

COURSE OUTCOMES (CO):

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

CO1	Know the concepts of computer hardware components.
CO2	Acquire the knowledge about the functions of hardware.
CO3	Install operating systems.
CO4	Know about the software applications and utilities.
CO5	Create users and groups.

20UDSSBP501	SBC PRACTICAL III: MySQL (INTERNAL EVALUATION)	SEMESTER - V

COURSE OBJECTIVES:

The course aims to

- Acquire the knowledge of query building.
- Know about basics of constraints.

Credit Points: 2 **Total Hours: 16**

S.NO	PROGRAMS	Hrs	CO
1.	Perform DDL commands.	**2**	**CO1**
2.	Perform DML commands.	**2**	**CO1**
3.	Create a table to implement integrity constraints and referential integrity constraints in column and table level.	**2**	**CO2**
4.	Create queries for Built-in functions.	**2**	**CO3**
5.	Create queries using limit clause and rand function.	**2**	**CO3**
6.	Implement queries using Group By, Having Clause and Order Clause.	**2**	**CO3**
7.	Implement different types of joins.	**2**	**CO4**
8.	Create user and assign privileges and roles.	**2**	**CO5**

WEB REFERENCES:

1.	http://dev.mysql.com/doc/refman/8.0/en/programs.html
2.	https://www.geeksforgeeks.org

COURSE OUTCOMES (CO):

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

CO1	Develop structured queries.
CO2	Implement record manipulation.
CO3	Know about functions.
CO4	Implement various joins.
CO5	Understand assigning privileges.

18ULS501	CAREER COMPETENCY SKILLS-III	SEMESTER – V

Course Objectives:

The course aims to

- Impart knowledge on the logical reasoning.
- Enhance employability skills and to develop career competency.

Total Hours: 15

UNIT	CONTENTS	Hrs	CO
I	Verbal Reasoning: Number Series Completion - Alpha Series Completion - Blood Relation - Distance and Direction – Analogy – Inequality - Classification.	3	CO1
II	Non-Verbal Reasoning: Series Completion - Analogy and Classification - Completion of Incompletion Pattern.	3	CO2
III	Non-Verbal Reasoning: Mirror Image and Water Image – Statement and Arguments - Cubes and Dices.	3	CO3
IV	Reasoning: Puzzle Arrangement - Syllogism - Input and Output.	3	CO4
V	Verbal Reasoning: Linear Arrangement - Circular Arrangement – Matrix Arrangement.	3	CO5

Text Book:

1	*RS Aggarwal,* **Test of Reasoning,** *S.Chand and Company Limited, 2017 Edition, New Delhi.*

Reference Book :

1	*Gajendra Kumar, Abhishek Banerjee,* **Verbal & Non-Verbal Reasoning For Competitive Exams,** *Disha publication, New Delhi.*

COURSE OUTCOMES (CO)

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

CO1	Understand the core concepts of Verbal Reasoning
CO2	Formulate Non Verbal Reasoning with shortcuts
CO3	Find Mirror Image, Cubes and Dices
CO4	Obtain the knowledge on shortcuts to solve Puzzles.
CO5	Solve Linear Arrangement and Matrices with shortcuts.

20UDSM601	**CORE XII: PYTHON PROGRAMMING**	**SEMESTER - VI**

COURSE OBJECTIVES:

The course aims to

- Design and program Python applications.
- Learn how to use lists, tuples, and dictionaries in Python programs.
- Identify Python object types.

Credits: 5 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**BASICS:** Python - Variables Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax – Comments - Standard Data Types Relational Operators - Logical Operators - Bit Wise Operators – Simple Input and Output.	**10**	**CO1**
II	**CONTROL STATEMENTS:** Control Flow and Syntax – Indenting - if Statement - statements and expressions - string operations - Boolean Expressions - while Loop - break and continue - for Loop. LISTS: List - list slices - list methods - list loop mutability aliasing - cloning lists – list parameters. TUPLES: Tuple assignment, tuple as return value - Sets Dictionaries.	**10**	**CO2**
III	**FUNCTIONS:** Definition-Passing parameters to a Function - Built-in functions - Variable Number of Arguments - Scope Type conversion - Type coercion - Passing Functions to a Function - Mapping Functions in a Dictionary Lambda – Modules - Standard Modules sysmath time – dir - help Function.	**10**	**CO3**
IV	**ERROR HANDLING:** Run Time Errors – Exception Model – Exception Hierarchy – Handling Multiple Exceptions –Data Streams – Access Modes Writing – Data to a File Reading - Data From a File – Additional File Methods – Using Pipes as	**10**	**CO4**

	Data Streams – Handling IO Exceptions-Working with Directories.		
V	**OBJECT ORIENTED FEATURES:** Classes Principles of Object Orientation – Creating Classes – Instance Methods – File Organization – Special Methods - Class Variables – Inheritance Polymorphism –Type Identification - Simple Character Matches – Special Characters - Character Classes Quantifiers – Dot Character – Greedy Matches Grouping – Matching at Beginning or End – Match Objects Substituting - Splitting a String - Compiling Regular Expressions.	**10**	**CO5**

TEXT BOOKS:	
1.	*Mark Summerfield.* 2009. **Programming in Python 3; A Complete introduction to the Python Language**, Addison-WesleyProfessional.
2.	*Martin C.Brown*. 2001. **Python: The Complete Reference**, McGraw-Hill.
REFERENCE BOOKS:	
1.	*Allen B.Downey*. 2016. **Think Python: How to Think Like a Computer Scientist**. [Second Edition], Updated for Python 3, Shroff/O'Reilly Publishers.
2.	*Guido van Rossum and Fred L.Drake Jr.*2011. **An Introduction to Python – Revised and updated for Python 3**.[Second Edition]. Network Theory Ltd.
3.	*Welsey J Chun*. 2012.**Core Python Application Programming.** Prentice Hall.
WEB REFERENCES:	
1.	https://www.w3schools.com/Python/default.asp
2.	https://www.tutorialspoint.com/python
3.	https://www.codeacademy.com/python

COURSE OUTCOMES (CO):

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

CO1	Know the concepts of basics of Python Programming.
CO2	Understand the knowledge about the control statements.
CO3	Develop the concepts of functions.
CO4	Implement the Error Handling functions.
CO5	Understand the OOPs features.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M
CO2	H	H	H	H	H
CO3	M	M	M	H	M
CO4	H	H	H	H	H
CO5	M	M	H	H	H

H-High; M-Medium; L-Low

20UDSM602	**CORE XIII: COMPUTER NETWORKS (Fifth Unit as Self-study)**	**SEMESTER - VI**

COURSE OBJECTIVES:

The Course aims to

- Understand the working principles of Network Layers.
- Acquire knowledge in Network Security and its Algorithms.

Credit Points: 4 **Total Hours: 50**

UNIT	**CONTENTS**	**Hrs**	**CO**
I	I**ntroduction** – Uses of Computer Networks – Network Hardware – Network Software - Reference models: The OSI Reference Model – TCP/IP Reference Model.	**10**	**CO1**
II	**The Physical Layer:** Guided Transmission Media – Wireless Transmission – Communication Satellites – Digital Modulation and Multiplexing – The Public Switched Telephone Network: Structure of the Telephone System – Switching.	**10**	**CO2**
III	**The Data link Layer:** Data link layer Design Issues – Error Detection and Correction. **The Network Layer:** The Network Layer Design Issues – Routing Algorithms - Congestion Control Algorithms.	**10**	**CO3**
IV	**The Transport Layer:** Elements of Transport Protocols – Congestion Control – The Internet Transport Protocols: UDP – The Internet Transport Protocols: TCP.	**10**	**CO4**
V	**The Application Layer:** DNS: The Domain Name System – Electronic mail – **Network Security:** Cryptography **-** Symmetric Key Algorithms – Public Key Algorithms –Communication Security – E- mail Security – Web Security.	**10**	**CO5**

TEXT BOOKS:	
1.	*Andrew S. Tanenbaum.* 2011. **Computer Networks.** [Fifth Edition].Pearson Prentice Hall.
REFERENCE BOOKS:	
1.	*Behrouz A. Forouzan*. 2003. **Data Communications and Networking.** [Second Edition]. Tata McGraw-Hill.
2.	*William Stallings*, 2011. **Data and Computer Communication**. [Eighth Edition]. PHI.
WEB REFERENCES:	
1.	https://www.geeksforgeeks.org/computer networks
2.	https://www.intronetworks.cs.luc.edu
3.	https://www.tutorialspoint.com

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of Computer Networks.
CO2	Acquire knowledge about Digital Media Transmission.
CO3	Understand the concepts of Design issues and Networking Algorithms.
CO4	Know the basics of Network protocols.
CO5	Gain knowledge of Network Security.

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UDSEL601	**ELECTIVE II: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS**	**SEMESTER–VI**

COURSE OBJECTIVES:

The Course aims to

- Demonstrate the knowledge of the building blocks of AI.
- Analyze and formalize the problems.

Credit Points: 4 **Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	**Introduction to Artificial Intelligence:** Introduction - Brief History - Intelligent Systems: ELIZA - Categorization of Intelligent Systems - Components of AI Program - Foundations of AI - Sub-areas of AI - Applications. Tic-Tac-Toe Game Playing: Approach1 - Approach2 - Approach3 - Development of AI Languages - Current Trends in AI**. Problem Solving State-space Search and Control Strategies:** Introduction - General Problem Solving: Production System - State-Space Search - Control Strategies.	**10**	**CO1**
II	**Exhaustive Searches:** Breadth-First Search - Depth-First Search - Depth-First Iterative Deepening - Bidirectional Search - Analysis of Search methods. **Heuristic Search Techniques:** General-Purpose Heuristic-Branch and Bound Search - Hill Climbing - Beam Search - A* Algorithm - Optimal Solution by A* Algorithm - Monotonic Function.	**10**	**CO2**
III	**Expert System and Applications:** Introduction - Phases in Building Expert Systems: Knowledge Engineering - Knowledge Representation. Expert System Architecture: Knowledge Base - Inference Engine - Knowledge Acquisition - Case History -	**10**	**CO3**

	User Interfaces - Explanation Module - Special Interfaces. Expert Systems versus Traditional Systems: Characteristics of Expert Systems - Evaluation of Expert Systems - Advantages and disadvantages of Expert Systems - Languages for ES Development. **Rule Based Expert Systems:** Expert System Shell in Prolog - Problem-Independent Forward chaining - ES Shells and tools - MYCIN Expert System and various Shells - Applications of Expert Systems.		
IV	**Machine-Learning Paradigms:** Introduction - Machine-Learning Systems: Components of a Learning System - Rote Learning - Learning by Taking Advice - Learning by parameter Adjustment - Learning by Macro-Operators - Learning by Analogy. Supervised and Unsupervised Learnings: Neural Network Based Learning - Supervised Concept Learning - Probability Approximating Correct Learning - Unsupervised Learning - Reinforcement Learning.	**10**	**CO4**
V	**Artificial Neural Networks: Introduction** - Artificial Neural Networks: The Neuron Networks - The Neuron Model - Activation Functions - Neural Network Architectures. Single-Layer Feed - Forward Networks: Perceptron: Neuron Model - Learning Algorithm for Perceptron - Perceptron for OR Function: Example - Limitations of Perceptron. Multi-Layer Feed – Forward Networks: Back-Propagation Training Algorithm for FFNN - Weight Update Rule - Delta Rule (Least Mean Square) for Error Minimization.	**10**	**CO5**

TEXTBOOKS:	
1	*SarojKaushik*. 2014. **Artificial Intelligence.** [Sixth Edition]. Cengage Learning India Pvt. Ltd.
REFERENCE BOOKS:	
1	*Dan W.patterson*. 1992. **Introduction to Artificial Intelligence and Expert Systems.** Prentice Hall of India, New Delhi.
2	*SturatJ.Rusell and Peter Norvig*.2010. **Artificial Intelligence.** Prentice.
3	*Elaine Rich, Kevin Knight, B,Nair*.2010. **Artificial Intelligence: A Modern Approach.** [Third Edition]. Prentice Hall of India, New Delhi.
WEB REFERENCES:	
1	https://www.tutorialspoint.com
2	http://www.epub.uni-regensburg.de.pdf
3	http://www.investopedia.com
4	https://www.sas.com

COURSE OUTCOMES (CO):

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

CO1	Acquire the basics of AI.
CO2	Analyze and formalize the problem as a state space, design and heuristics.
CO3	Attain the capability to various expert system methods.
CO4	Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
CO5	Understand the concepts of Artificial Neural Networks.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	H
CO2	H	H	H	H	H
CO3	M	H	M	H	H
CO4	H	H	H	H	H
CO5	H	H	H	H	H

H-High; M-Medium; L-Low

20UDSEL602	**ELECTIVE II: INFORMATION RETRIEVAL TECHNIQUES**	**SEMESTER - VI**	
COURSE OBJECTIVES: The Course aims to • Learn the information retrieval models. • Familiarize with Web Search Engine.			
Credit Points: 4		**Total Hours: 50**	
UNIT	**CONTENTS**	**Hrs**	**CO**
I	**INTRODUCTION** Introduction - History of IR - Components of IR - Issues – Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine - Characterizing the web.	**10**	**CO1**
II	**INFORMATION RETRIEVAL** Boolean and vector - space retrieval models - Term weighting - TF-IDF weighting - cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR – Latent Semantic Indexing - Relevance feedback and query expansion.	**10**	**CO2**
III	**WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING** Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers - Focused Crawling - web indexes – Near-duplicate detection - Index Compression - XML retrieval.	**10**	**CO3**
IV	**WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH**		

	Link Analysis – hubs and authorities – Page Rank and HITS algorithms - Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop & Map Reduce - Evaluation - Personalized search - Collaborative filtering and content - based recommendation of documents and products – handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross - Lingual Retrieval.	**10**	**CO4**
V	**DOCUMENT TEXT MINING** Information filtering; organization and relevance feedback – Text Mining - Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).	**10**	**CO5**
TEXT BOOKS:			
1.	*C. Manning, P. Raghavan, and H. Schütze*, **Introduction to Information** Retrieval, Cambridge University Press, 2008.		
2.	*Ricardo Baeza -Yates and BerthierRibeiro* - Neto, Modern Information Retrieval: **The Concepts and Technology behind Search** 2 nd Edition, ACM Press Books 2011.		
3.	*Bruce Croft, Donald Metzler and Trevor Strohman*, **Search Engines: Information Retrieval in Practice**, 1 st Edition Addison Wesley, 2009.		
4.	*Mark Levene*, **An Introduction to Search Engines and Web Navigation**, 2nd Edition Wiley, 2010.		

REFERENCE BOOKS:	
1.	*Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack*, **Information Retrieval: Implementing and Evaluating Search Engines**, The MIT Press, 2010.
2.	*OphirFrieder* "**Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series** ", 2 nd Edition, Springer, 2004.
3.	*Manu Konchady*, "**Building Search Applications: Lucene, Ling Pipe**", and First Edition, Gate Mustru Publishing, 2008.
WEB REFERENCES:	
1.	https://www.springer.com
2.	https://www.tutorialspoint.com
3.	http://www.scholarpedia.org

COURSE OUTCOMES (CO):

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

CO1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO2	Discuss the decision tree algorithm and identity and overcome the problem of over fitting.
CO3	Discuss and apply the back propagation algorithm and genetic algorithms to various problems
CO4	Apply the Bayesian concepts to machine learning
CO5	Analyze and suggest appropriate machine learning approaches for various types of problems

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	H	H
CO4	H	H	M	H	H
CO5	H	H	M	H	H

H-High; M-Medium; L-Low

20UDSMP601	CORE PRACTICAL VIII: PYTHON PROGRAMMING	SEMESTER - VI

COURSE OBJECTIVES:

The course aims to

- Acquire the knowledge of queries.
- Develop the programming skills.

Credit Points: 2 **Total Hours: 24**

S.NO.	PROGRAMS	Hrs	CO
1.	Program to print all Prime numbers in an interval.	**3**	**CO1**
2.	Program to perform various operations on LIST and TUPLES.	**3**	**CO1**
3.	Program to perform various operations on SET and DICTIONARY.	**3**	**CO2**
4.	Program to handle multiple exceptions.	**3**	**CO3**
5.	Program to multiply two matrices using nested loops and using **NumPy array.**	**3**	**CO3**
6.	Program to count the number of matching characters in a pair of string using "**re module"**.	**3**	**CO4**
7.	Program to solve a linear algebra system which can be given as 1x + 2y =5 and 3x + 4y =6 using **SciPy and NumPy modules.**	**3**	**CO4**
8.	Program to read a csv file consists of students marks statement and write in another csv file with total, average and grade .	**3**	**CO5**

WEB REFERENCES:

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

COURSE OUTCOMES (CO):

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

CO1	Develop Simple programs.
CO2	Implement the LIST, TUPLES, SET and DICTIONARY.
CO3	Develop programs using Exceptions and loops.
CO4	Implement various modules like re module, SciPy and NumPy modules**.**
CO5	Develop program using files.

20UDSMP602	**CORE PRACTICAL IX: COMPUTER NETWORKING**	**SEMESTER - VI**

COURSE OBJECTIVES:

The course aims to

- Understand the working principle of various networking devices.
- Know the concept of configuring IP address.

Credit Points: 2 **Total Hours: 18**

S.No.	PROGRAMS	Hrs	CO
1.	Study of different types of network cables and implement the cross wired cable and straight through cable using clamping tool.	**3**	**CO1**
2.	Configuring host IP, subnet mask and default gateway in a LAN system (TCP/IP Configuration).	**3**	**CO2**
3.	Implementing Peer to Peer Networking Connection using two systems.	**3**	**CO3**
4.	Install and configure network devices: Switch and Hub.	**3**	**CO4**
5.	Install and Configure Wired and Wireless NIC and transfer files between systems in LAN and Wireless LAN	**3**	**CO5**
6.	Transfer files between system in LAN using FTP configuration, install printer server in a LAN and share the printer in a network.	**3**	**CO5**

WEB REFERENCES:

1.	http://www.wikihow.com
2.	https://www.geeksforgeeks.org

COURSE OUTCOMES (CO):

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

CO1	Develop the concepts of network cables.
CO2	Implement the configuration process.
CO3	Develop programs using peer to peer networking.
CO4	Install the network devices using switch and hub.
CO5	Know about the LAN technologies.

20UDSSBP601	SBC PRACTICAL IV: PHP (INTERNAL EVALUATION)	SEMESTER - VI

COURSE OBJECTIVES:

The course aims to

- Understand how server-side programming works on the web.
- Develop web programming skills.

Credit Points: 2 **Total Hours: 16**

S.NO	PROGRAMS	Hrs	CO
1.	Program to remove specific element by value from an array.	**2**	**CO1**
2.	Program using decision making and looping statements.	**2**	**CO1**
3.	Program to create a simple calculator using switch case.	**2**	**CO2**
4.	Program to pass value from one form to another form using session and cookies.	**2**	**CO2**
5.	Design an authentication web page to check username and password from database.	**2**	**CO3**
6.	Program for mark statement to find total, average and grade using functions.	**2**	**CO4**
7.	Create a program to calculate electricity bill.	**2**	**CO5**
8.	Design a web page to add, edit and delete the records from database.	**2**	**CO5**

WEB REFERENCES:

1.	https://www.phpprogramming.com/tutorial/php-tutorial.html
2.	https://www.geeksforgeeks.org

COURSE OUTCOMES (CO):

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

CO1	Develop about the concept of array.
CO2	Implement programs using functions, control and looping statements.
CO3	Develop web page authentication
CO4	Implement record manipulation.
CO5	Develop web application.

18ULS601	**CAREER COMPETENCY SKILLS - IV**	**SEMESTER – VI**

Course Objectives:

The course aims to

- Understand the basic needs of Communication
- Utilize the communication skills for achieving at the time of Interview

Total Hours: 15

UNIT	**CONTENTS**	**Hrs**	**CO**
I	Basic Grammar - English usage - Reading and Writing (Level-2) Direct and Indirect Speech	3	**CO1**
II	Spotting Errors – Parts of speech and Punctuation	3	**CO2**
III	Role Play – Just a Minute (JAM) - Group Discussion	3	**CO3**
IV	Interview Presentation (Self-Introduction) - Critical thinking, problem solving.	3	**CO4**
V	Dress Code and Body Language – Leadership.	3	**CO5**

Text Books

1	*Anne Seaton, Y.H.Mew,* **Basic English Grammar for English-Book 1, Learners**, *Saddlepoint Publishers (E-Copy)*
2	*Mark Newson,* **Basic English Syntax with Exercises,** *(E-Copy)*

Reference Book

1	*S.Chand, Dr.R.S.Agarwal,* **Objective General English**

COURSE OUTCOMES (CO):

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

CO1	Recall the basic grammar in language.
CO2	Concentrate on sentence correction.
CO3	Recognize the differences among facts, opinions and judgments.
CO4	Develop their personal skills through interview.
CO5	Appropriately apply their learning and leadership style and strength.

20UDSAC301	ADD-ON COURSE I: SCILAB	SEMESTER - III

Course objectives:

The course aims to

- Understand the concept of scientific applications.
- Provides a sound knowledge about mathematical operations and data analysis.

Total Hours: 20

S.No	EXPERIMENT	Hrs	CO
1	Elementary math functions and Trigonometric functions	2	**CO1**
2	Creating random numbers defining matrices using colon operator in matrices	2	**CO1**
3	Matrix indexing , creating sub matrix , deleting row or column , finding dimension of a matrix	2	**CO2**
4	Transpose of a matrix and concatenating of a matrix	2	**CO2**
5	Matrix generators zeros , ones , diag and rand	2	**CO2**
6	Dot product , matrix multiplication , matrix powers	2	**CO3**
7	Matrix inverse , determinant and Rank of a matrix	2	**CO3**
8	Eigen values and Eigen vectors	2	**CO4**
9	Solving linear system of equations	2	**CO5**
10	Simple program by using control flow	2	**CO5**

REFERENCE BOOKS:

1.	*Stephen J.Chapman.***Programming in MATLAB for Engineers.** Cengage Learning India Limited.
2.	*Delores M Etter., David C Kuncicky, and Holly Moore*. 2009. **Introduction to MATLAB** Pearson Education.

WEB REFERENCES:

1.	https://www.scilab.org
2.	https://www.cse.iitb.ac.in

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Understand the basic math functions
CO2	Perform matrix addition and subtractions
CO3	Understand the usage of matrix
CO4	Understand the concept of Eigenvalues and Eigenvectors
CO5	Able to apply linear programming functions

20UDSAC301	**ADD-ON COURSE II: STATISTICAL SOFTWARE (SPSS)**	**SEMESTER - IV**

Course objectives:

The course aims to

- Give a good grip on concepts in analyzing the data using SPSS Software.
- Provides a sound knowledge about test of Significance, Correlation, Regression and Non-parametric test.

Total Hours: 20

S.No	EXPERIMENT	Hrs	CO
1	Simple and Multiple Bar diagram	2	**CO1**
2	Simple and Multiple line diagram	2	**CO1**
3	Pie diagram and Histogram	2	**CO1**
4	Mean, Median, Mode	2	**CO2**
5	Standard Deviation, Coefficient of Variation, Skewness and Kurtosis	2	**CO2**
6	Karl Pearsons's correlation coefficient	2	**CO2**
7	Regression lines	2	**CO3**
8	t-test for single mean	2	**CO4**
9	chi-square test for independent of attributes	2	**CO5**
10	f-test	2	**CO5**

REFERENCE BOOKS:

1.	*Andy Field*. 2006. **Discovering Statistics Using SPSS**. [Second Edition]. SAGE Publications.
2.	*Robert H. Carver,andJane Gradwohl Nash*. 2007. **Doing Data Analysis with SPSS Version -14**. Thomson Brookscole.

WEB REFERENCES

1.	https://www.ibm.com/analytics
2.	https://www.spss-tutorials.com

COURSE OUTCOMES (CO):

After completion of the course, the student will be able to:

CO1	Create different varieties of diagram
CO2	Understand the basic Statistical analysis
CO3	Model to predict the value
CO4	Compare the means of the samples
CO5	Test the hypothesis that the samples

20UDSAL401	**ADVANCED LEARNER COURSE: INFORMATION SECURITY**	**SEMESTER - IV**

COURSE OBJECTIVES:

The course aims to

- Impart the importance of Information Security.
- Understand legal and ethical issues of Information Security
- Develop Systematic Project Management to ensure Security in an Organization

Credit Points: 2

UNIT	CONTENTS	CO
I	**Information Security: An Introduction:** Introduction – The History of Information Security – What is Security? – Components of an Information System – The System Development Life Cycle- The Security System Development Life Cycle. **The need for Security? :** Introduction - Business needs first – Threats and Attacks – Secure Software Development.	**CO1**
II	**Legal and Professional Ethical issues in Information Security:** Introduction – Law and Ethics in Information Security- Relevant U.S. Laws – International laws and legal bodies –Ethics and Information Security – Codes of Ethics and Professional Organizations. **Managing IT Risk:** Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies.	**CO2**

III	**How to Plan for Security:** Introduction **-** Information Security Planning and Governance - Information Security Policy, Standards, and Practices – The Information Security Blueprint – Security Education, Training, and Awareness Program. **Security Technology: Wireless VPNs and Firewalls:** Introduction – Access Control – Firewalls – Protecting Remote Connections.	**CO3**
IV	**Security Technology: Intrusion Detection, and Prevention Systems, Other Security Tools:** Introduction – Intrusion Detection and Prevention systems – Honey pots, Honey nets, and Padded cell systems – Scanning and Analysis Tools – **Cryptography :** introduction - foundations of cryptology-cipher methods-cryptographic algorithms	**CO4**
V	**Implementing Information Security:** Introduction – Information Security Project Management – Technical Aspects of Implementation – Nontechnical Aspects of Implementation - Information Systems Security Certification and Accreditation. **Maintenance of Information Security:** Introduction – Digital Forensics.	**CO5**
TEXTBOOKS:		
1	*Michael E.Whitman and Herbert J.Mattord* .2018. **Principles of Information Security.** [Seventh Impression] Cengage Learning India Private Limited, Delhi.	
REFERENCE BOOKS:		
1	*Calabrese*. 2006. **Information Security Intelligence: Cryptographic Principles and Applications.** [India Edition]. Thomson Delmar Learning	
2	*Bhaskar, S.M. and Ahson. S.I.* 2008. **Information Security – A Practical Approach**. [First Edition] Narosa Publishing House, New Delhi.	

WEB REFERENCES:	
1	https://www.tutorialspoint.com
2	http://www.epub.uni-regensburg.de.pdf
3	http://www.investopedia.com
4	https://www.sas.com

COURSE OUTCOMES (CO):

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

CO1	Understand the basics of security
CO2	Identify information systems risks and controls.
CO3	Know network security threats and counters measures.
CO4	Know advanced security issues and technologies.
CO5	Appreciate the value of information to the modern Organization.

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	H	M	M	H
CO2	H	M	M	H	H
CO3	M	H	H	H	H
CO4	H	H	H	H	H
CO5	H	H	H	H	H

H-High; M-Medium; L-Low

20UDSAL501	**ADVANCED LEARNER COURSE: CYBER SECURITY**	**SEMESTER - V**

COURSE OBJECTIVES:

The course aims to

- Build network and system administration fundamentals.
- Learn how to detect threats, protect system and anticipate potential cyber attacks.
- Implement and testing of security monitoring, intrusion detection and analysis of events and trends.

Credits: 2

UNIT	CONTENTS	CO
I	**Cyber Security Fundamentals:** Network and Security Concepts: Information Assurance Fundamentals – Basic Cryptography - Symmetric Encryption - Public Key Encryption- The Domain Name System(DNS)-Firewalls- Virtualization- Radio Frequency Identification.	**CO1**
II	**Attacker Techniques And Motivations**: How Hackers Cover Their Tracks - How And Why Attackers Use Proxies - Tunnelling Techniques **- Fraud Techniques:** Phishing, Smishing, Vishing, and Mobile Malicious Code - Rogue Antivirus - Click Fraud - Threads Infrastructure - Fraud Techniques- Threat Infrastructure.	**CO2**
III	**Exploitation: Techniques to Gain a Foothold**: Shell code – Integer Overflow Vulnerabilities – Stack-Based Buffer Overflows – Format String Vulnerabilities – SQL Injection – Malicious PDF Files – Race Conditions – Web Exploit Tools.	**CO3**

IV	Ma**licious** C**ode: Self-Replicating Malicious Code:** Worms – Virus - **Evading Detection and Elevating Privileges:** Obfuscation - Virtual Machine Obfuscation - Persistent Software Techniques **–Rootkits:** User mode Rootkits - Kernel Mode Rootkits **– Attacks against Privileged User Accounts and Escalation of Privileges:** Many Users Already Have Administrator Permissions - Getting Administrator Permissions - **Virtual Machine Detection:** Fingerprint Everywhere – Understanding the Rules of the Neighborhood – Detecting Communication with the Outside World.	**CO4**
V	**Stealing Information and Exploitation**: Form Grabbing - Man-in-the-Middle Attacks - DLL Injection - Browser Helper Objects. **Defense and Analysis Techniques:** Memory Forensics – Honeypots - Malicious Code Naming - Automated Malicious Code - Intrusion Detection Systems.	**CO5**
TEXT BOOK:		
1.	*James Graham, Richard Howard and Ryan Olsan***.** 2011. **Cyber Security Essentials**. CRC Press, New York. **(Unit I-V)**	
REFERENCE BOOKS:		
1.	*George K. Kostopoulos*. 2013. **Cyberspace and Cyber Security**. CRC Press, New York.	
2.	*Josiah Dykstra.* 2015**. Essential Cybersecurity**. [First Edition]. Oreilly Publications, USA.	
3.	*Niall Adams and Nicholas Heard*. 2013. **Data Analytics for Network Cyber Security**. [First Edition]. Imperial College Press, USA.	
WEB REFERENCES:		
1.	https://www.javapoint.com/cyber-security-principles	
2.	https://www.tutorialpoint.com/computer_security	
3.	https://intellipaat.com/tutorial/ethical-hacking_cyber-security	

COURSE OUTCOMES (CO):

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

CO1	Know the fundamentals of Cyber Security.
CO2	Describe the tactics, techniques and procedures used by cyber criminals.
CO3	Discriminate how Cyber Security professionals use technologies, processes and procedures to defend all components of the network.
CO4	Define technologies, products and procedures used to protect confidentiality, ensure integrity and provide high availability.
CO5	Implement continuous network monitoring and provide real-time security solutions.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	H
CO2	M	H	H	M	M
CO3	M	H	H	M	M
CO4	M	M	H	H	H
CO5	M	H	M	H	H

H-High; M-Medium; L-Low

20UDSNM301	**NMEC I : INTERNET TECHNOLOGY (Course offered to other than Data Science and Computer Science students)**	**SEMESTER - III**

COURSE OBJECTIVES:

The course aims to

- Understand fundamentals of Internet, Connectivity and its Resource Requirements.
- Know about mailing system and applications of Internet.

Credits: 2 **Total Hours: 26**

UNIT	CONTENTS	Hrs	CO
I	**Introduction to internet**: What is Internet? - Evolution and History of Internet-Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works? - Anatomy of Internet- Internet Addressing- Internet vs. Intranet- Impact of Internet- Governance of Internet.	4	CO1
II	**Internet Technology and Protocol:** ISO-OSI Reference Model**- Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet- Multimedia and Animation.	6	CO2
III	**WWW and WebBrowser:**WWW- Evolution of Web- Basic Elements of WWW- Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web	6	CO3

	Publishing- Web Page Design.		
IV	**Email:** E-Mail Basics - E-Mail System- E-Mail Protocol- E-Mail Addresses- Structure of an E-Mail Message- E-Mail Clients & Servers- Mailing List- E-Mail Security.	**5**	**CO4**
V	Usenet and Internet Relay Chat: What is Usenet? - Newsgroup Hierarchies- What is a Newsreader? - How do you Read Newsgroups? - Who Administers Usenet? - Common News reading Tasks- How to Read Articles from Network News? - Relationship between Netnews and E-Mail- What is IRC? - Channels- Nicknames-Microsoft Net Meeting. Internet and Web Security: Overview of Internet Security-Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.	**5**	**CO5**
TEXT BOOK:			
1.	*ISRD Group*. 2012. **Internet Technology and Web Design.** [Fourth reprint]. Tata McGraw-Hill Education Private Limited., New Delhi.		
REFERENCE BOOKS:			
1.	*Paul Deite , Harvey Deitel , Abbey Deite*2014**Internet & World wide Web-How to Program.** [Fifth Edition]. PearsonEducatin		
2.	*McFedries Paul* **Teach yourself computers and the internet visually**. [Fourth Edition]. John Wiley& Sons inc		
3.	*DR.R.K.JAIn*2015**Internet Technology and Web Design** .Khanna Book Publishing		
WEB REFERENCES:			

1.	https://www.tutorialspoint.com/intarnet_technologies/
2.	https://www.ironspider.ca

COURSE OUTCOMES (CO):

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

CO1	Define terms related to intranet.
CO2	Understand how computers are connected to the intranet.
CO3	Demonstrate the ability to users the world wide web.
CO4	Demonstrate an understanding of and the ability to use electronic mail.
CO5	Understand the principles of intranet services such as mailing lists, Usenet News groups, and instant messaging.

MAPPING:

PSO/CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	M
CO2	L	M	L	M	M
CO3	H	M	L	H	H
CO4	H	M	L	H	H
CO5	H	M	M	H	H

H-High; M-Medium; L-Low

20UDSNM401	**NMEC II: PRINCIPLES OF WEB DESIGN (Course offered to other than Data Science and Computer Science students)**	**SEMESTER- IV**

COURSE OBJECTIVES:

The course aims to

- Know fundamentals of basic programming language for World Wide Web.
- Learn, How HTML is used to build basic web pages?

Credits: 2 **Total Hours: 26**

UNIT	CONTENTS	Hrs.	CO
I	**Getting Started with HTML:** HTML and XHTML Basics: Understanding HTML and XHTML - Setting Up the Document Structure – Formatting Text by Using Tags.	**6**	**CO1**
II	**Getting Started with HTML:** Using Lists and Backgrounds – Creating Hyperlinks and Anchors. **Style Sheets and Graphics:** Displaying Graphics.	**5**	**CO2**
III	**PageLayout and Navigation:** Creating Tables – Formatting Tables.	**5**	**CO3**
IV	**Page Layout and Navigation:** Creating Division-Based Layouts – Creating User Forms.	**5**	**CO4**
V	**PageLayout and Navigation:** Using Frames for Layout – Incorporating Audio and Video.	**5**	**CO5**

TEXT BOOK:

1.	*FaitheWempen*. 2006. **Microsoft Step by Step HTML and XHTML.** [First Edition]. PHI, New Delhi.

REFERENCE BOOKS:

1.	*Elizabeth Castro.* 2014. **HTML for The World Wide Web.** [Fourth Edition].

	Pearson Education
WEB REFERENCES:	
1.	https://its.temple.edu/creating-tables-html#1714
2.	https://www.w3schools.com
3.	https://www.guru99.com

COURSE OUTCOMES (CO):

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

CO1	Understand the basic concepts of HTML and create basic web pages.
CO2	Insert and format text and implementing a variety of Hyperlinks to connect pages and communicate with users via email link.
CO3	Understand the basics of table and its properties.
CO4	Create modify and format a basic layout.
CO5	Apply audio and video clips in a web page

MAPPING:

PSO/CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	L	M	M
CO2	H	M	M	M	M
CO3	M	M	L	M	H
CO4	H	L	L	H	H
CO5	H	M	L	H	H

H-High; M-Medium; L-Low

GUIDELINES

1. SUBMISSION OF RECORD NOTE BOOKS:

Candidates appearing for Practical Examinations shall submit Bonafide Record Note Books prescribed for Practical Examinations, otherwise the candidates will not be permitted to appear for the Practical Examinations.

2. PASSING MINIMUM AND INTERNAL MARK DISTRIBUTION

(Theory and Practical)

(i) THEORY

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Theory paper with a passing minimum of 30 marks in External out of 75.

***Internal Marks Distribution* [CA- Total Marks: 25]**

Attendance	: 5 Marks
Assignment	: 5 Marks
Internal Examinations	: 15 Marks
Total	**: 25 Marks**

(ii) PRACTICAL

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in each Practical paper with a passing minimum of 24 marks in External out of 60.

***Internal Marks Distribution* [CA- Total Marks: 40]**

Experiments	: 10 Marks
Attendance	: 5 Marks
Record	: 5 Marks
Internal Examinations	: 20 Marks
Total	**: 40 Marks**

(iii) PROJECT and Viva-Voce

The candidate shall be declared to be passed the Examination, if the candidate secures not less than 40 marks put together out of 100 in the Comprehensive Examination in Project viva-voce with a passing minimum of 24 marks in External out of 60.

***Internal Marks Distribution* [CA- Total Marks: 40]**

Research work done	: 10 Marks
Attendance	: 5 Marks
Record	: 5 Marks
Review	: 20 Marks
Total	**: 40 Marks**

(iv) CAREER COMPETENCY SKILLS

1. CCS I – Online Examination (III Semester)

- 100 questions - 100 minutes
- Twenty questions from each UNIT.

2. CCS II - Viva Voce (IV Semester)

- A student has to come in proper dress code and he/she should bring 2 copies of resume for the Viva Voce.
- A student may be asked to
  - Give Self Introduction
  - Submit the resume to the examiner(s) and answer the questions based on it.
  - Speak on any given topic for atleast two minutes.

- Give a presentation for 10 minutes on a topic of their choice.
- Sit with other students in a Group for a Discussion.

3. QUESTION PAPER PATTERN AND MARK DISTRIBUTION

(i) THEORY (For 75 marks)

Question Paper Pattern and Mark Distribution

1. **PART – A (10 x 2 = 20 Marks)**
   Answer ALL questions
   Two questions from each UNIT

2. **PART – B (5 x 5 = 25 Marks)**
   Answer ALL questions
   One question from each UNIT with Internal Choice

3. **PART – C (3 x 10 = 30 Marks)**
   Answer ANY THREE questions
   Open Choice – 3 out of 5 questions
   One question from each UNIT

(ii) PRACTICAL

Question Paper Pattern and Mark Distribution [Maximum Marks 60]

Question Paper Pattern

- Practical Examinations shall be conducted at the end of concern Semester.
- Student shall write two questions as examiners choice from the practical list.

External Marks Distribution [CE- Total Marks: 60]

For each practical question the marks shall be awarded as follows:

i)	Aim and Algorithm / Flowchart	: 20 Marks
ii)	Source Code	: 20 Marks
iii)	Test and debug	: 10 Marks
iv)	Output and Result	: 10 Marks
	Total	**: 60 Marks**

(iii) PROJECT

<u>External Marks Distribution</u> [CE- Total Marks: 60]

i)	Documentation	: 20 Marks
ii)	Presentation	: 20 Marks
iii)	Viva Voce	: 20 Marks
	Total	: 60 Marks

Marks maybe proportionately reduced for the errors committed in each of the above.