DEPARTMENT OF
B. Voc. SOFTWARE DEVELOPMENT
(2022-23)

HOLY CROSS COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI-620 002
SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES
DEPARTMENT OF B. Voc. (SOFTWARE DEVELOPMENT)
CHOICE BASED CREDIT SYSTEM
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

Programme Outcomes (POs)

PO 1 - Demonstrate ability and attitude to acquire knowledge and skills in the advancing global scenario to apply them effectively and ethically for professional and social development.

PO 2- Involve in research and innovative endeavors and share their findings for the wellbeing of thesociety.

PO 3- Work effectively in teams and take up leadership in multi-cultural milieu.

PO 4- Act with moral, ethical and social values in any situation.

PO 5- Excel as empowered woman to empower women

PO 6- Participate in activities towards environmental sustainability goals as responsible citizens.

PO 7- Promote Analytical and logical skill to make them to work effectively in IT industry as a taskmanager.

PO 8- Inculcate innovative techniques and computational knowledge for industrial needs and societalempowerment.

PO 9 - Bring forth the holistic personality with critical, cognitive and inclusive thinking.

Programme Specific Outcomes (PSOs)

PSO 1 – Apply the acquired knowledge in diverse areas of software development to provide creativesolutions for real-time computational problems.

PSO 2 – Create innovative software applications for Web, Mobile, Virtual, Cloud and Smart environments by adapting emerging technologies.

PSO 3 – Develop practical competency and potential in software development to meet the demand ofsoftware industries.

(For Candidates admitted in the academic year 2021-2022)

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-620 002.

SCHOOL OF MATHEMATICAL COMPUTATION SCIENCES

DEPARTMENT OF B. Voc. (SOFTWARE DEVELOPMENT)

CHOICE BASED CREDIT SYSTEM

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

COURSE PATTERN

B. Voc. (SOFTWARE DEVELOPMENT)

Sem	Part	Course	Title of the Course	Code	Hrs./ Wk	Credits	Marks
I	I	Language	Tamil Paper I / Hindi Paper I / French Paper I	U21TL1GEN01/ U21HN1HIN01/ U21FR1FRE01	3	3	100
	II	English	Practical English-I	U21SD1ENT01	3	3	100
	III	Major Core -1	Programming in C	U21SD1MCT01	4	4	100
		Major Core -2	Programming inC-Lab	U21SD1MCP02	6	5	100
		Major Core -3	MS-OFFICE and UNIX- Lab	U21SD1MCP03	4	3	100
		Allied -1	Basic Mathematics	U21SD1ALT01	4	2	100
		Allied -2	Fundamentals of Computer Science	U21SD1ALT02	3	3	100
	IV	Environmental Studies	Environmental Studies	U21RE1EST01	2	1	100
		Value Education	Ethics I/ Bible Studies I/ Catechism I		1	-	-
	VI	Service Oriented Course		-	-	-	-
	III	Internship in SD-1		U21SD1INT01	-	6	100
TOTAL					30	30	900
II	I	Language	Tamil Paper- II/ Hindi Paper -II/ French Paper- II	U21TL2GEN02/ U21HN2HIN02/ U21FR2FRE02	3	3	100
	II	English	Practical English-II	U21SD2ENT02	3	3	100
	III	Major Core – 4	Data Structures and Algorithms	U21SD2MCT04	5	5	100
		Major Core – 5	Web Development Tools- Lab	U21SD2MCP05	5	4	100
		Major Core – 6	Basics of Accounting & Tally- Lab	U21SD2MCP06	4	3	100
		Allied -3	Statistics for Data Analytics	U21SD2ALT03	4	2	100
	IV	Skill Based Course – 1	Soft Skills Development	U21SS2SBC01	2	1	100
		Skill Based Course- 2	Sustainable Rural Development and Student Social Responsibility	U21RE2SBC02	2	1	100
		Industrial Relations	Java Script Programming	U21SD2IRT01	1	1	100
		Value Education	Ethics I/ Bible Studies I/ Catechism I	U21VE2LVE01/ U21VE2LVB01/ U21VE2LVC01	1	1	100
	VI	Service Oriented Course		-	-	-	-
	III	Internship in SD-2		U21SD2INT02		6	100
TOTAL					30	30	1100

Sem	Part	Course	Title of the Course	Code	Hrs./Wk	Credits	Marks
III	I	Language	Tamil Paper- III/ Hindi Paper-III/ French Paper- III	U21TL3GEN03/ U21HN3HIN03/ U21FR3FRE03	3	3	100
	II	English	Practical English- III	U21SD3ENT03	3	3	100
	III	Major Core-7	Java programming	U21SD3MCT07	4	4	100
		Major Core-8	Computer Networks	U21SD3MCT08	5	4	100
		Allied-4	Digital Electronics and Microprocessors	U22PH3ALT06	4	2	100
		Major Elective-1	Java programming-Lab	U21SD3MEP01	4	3	100
	IV	Major Skill Based Elective - 1	Animation- Lab	U21SD3SBP01	2	1	100
		Non-Major Elective-1	Non-Major Elective-1		3	3	100
		Gender Studies	Gender Studies	U21WS3GST01	1	1	100
		Value Education	Ethics / Bible Studies / Catechism		1	-	-
	VI	Service Oriented Course			-	-	-
	III	Internship in SD-3		U21SD3INT03	-	6	100
	TOTAL				30	30	1000
IV	I	Language	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	U21TL4GEN04/ U21HN4HIN04/ U21FR4FRE04	3	3	100
	II	English	Practical English-IV	U21SD4ENT04	3	3	100
	III	Major Core-9	Database Systems	U21SD4MCT09	4	4	100
		Major Core-10	Database Systems- Lab	U21SD4MCP10	4	3	100
		Major Elective -2	Augmented and Virtual Reality-Lab	U21SD4MEP02	4	3	100
		Allied -5	Android Development-Lab	U21SD4ALP05	4	2	100
		Allied -6	Fundamentals of Entrepreneurship	U21EC4ALT07	4	2	100
	IV	Non-Major Elective-2	Non-Major Elective-2	-	3	3	100
		Value Education	Ethics II/ Bible Studies II/ Catechism II	U21VE4LVE02/ U21VE4LVB02/ U21VE4LVC02	1	1	100
	VI	Service Oriented Course		-	-	2(EC)	100
	III	Internship in SD-4		U21SD4INT04	-	6	100
TOTAL					30	30+2(EC)	1100

Sem	Part	Course	Title of the Course	Code	Hrs/ Wk	Credits	Marks
V	III	Major Core-11	Software Engineering	U21SD5MCT11	4	3	100
		Major Core-12	Programming with Python	U21SD5MCT12	4	4	100
		Major Core-13	Python Programming-Lab	U21SD5MCP13	4	4	100
		Major Core-14	Operating System	U21SD5MCT14	4	3	100
		Major Core-15	Cloud Computing	U21SD5MCT15	4	3	100
		Major Elective-3	C# and .Net Programming-Lab	U21SD5MEP03	4	3	100
	IV	Non-Major Elective – 3	Non-Major Elective – 3	-	3	3	100
		Major Skill Based Elective-2	Data Analytics-Lab	U21SD5SBP02	2	1	100
		Value Education	Ethics-III / Bible Studies- III/ Catechism-III		1	-	-
	VI	Online Course		U21OC5ECT01	-	2(EC)	100
	III	Internship in SD-5		U21SD5INT05	-	6	100
	TOTAL				30	30+2(EC)	1000
VI	III	Major Core-16	Software Testing	U21SD6MCT16	5	4	100
		Major Core-17	Internet of Things	U21SD6MCT17	5	5	100
		Major Core-18	Software Testing-Lab	U21SD6MCP18	5	4	100
		Major Core-19	Internet of Things- Lab	U21SD6MCP19	5	4	100
		Major Elective-4	Information and Cyber Security	U21SD6MET04	4	3	100
	IV	Non-Major Elective-4	Non-Major Elective-4	-	3	3	100
		Skill Based Course-3	Research Methodology	U21DS6SBC03	2	1	100
		Value Education	Ethics-III / Bible Studies-III/ Catechism-III	U21VE6LVE03/ U21VE6LVB03/ U21VE6LVC03	1	-	100
	V	Extension Activities	RESCAPES-Impact Study of Project	U21RE6ETF01	-	4(EC)	100
	III	Internship in SD-6		U21SD6INT06	-	6	100
	TOTAL				30	30+4(EC)	1000
	GRAND TOTAL				180	180+8(EC)	6100

List of Non-Major Elective Courses
(For the Candidates admitted in the academic year 2021-2022)

Non-Major Elective Courses offered by department

Sem	Part	Course	Title of the Course	Code	Hrs/ Wk	Credits	Marks
III	IV	Non-Major Elective-1	HTML and Java Script -Lab	U21SD3NMP01	3	3	100
IV	IV	Non-Major Elective-2	Graphics and Animation- Lab	U21SD4NMP02	3	3	100
V	IV	Non-Major Elective-3	Fundamentals of Web Technologies	U21SD5NMT03	3	3	100
VI	IV	Non-Major Elective-4	Basics of Information Security	U21SD6NMT04	3	3	100

(For Candidates admitted in the academic year 2021-2022)

Course Title	**PRACTICAL ENGLISH I**
Total Hours	**45**
Hours/Week	**3**
Code	**U21SD1ENT01**
Course Type	**Theory**
Credits	**3**

CONSPECTUS

To understand the communication process and basics skills of Listening, Speaking, Reading & Writing and apply them in the work place scenarios and day-to-day lives

COURSE OBJECTIVES

1. To learn the fundamentals of the communication process and to be able to communicate effectively in both formal and informal situations
2. To develop effective listening skills and apply them to communicate better.
3. To identify those aspects of self and to build a better profile of the self to become employable
4. To discover and comprehend different kinds of texts to build better vocabulary and language
5. To build effective writing skills and to demonstrate writing official mails and writing for pleasure

UNIT I **9Hrs**

The Communication Process

Definition of Communication – The communication process - Internal and External Communication – Vertical & Grapevine Communication - Roles- Message-Medium- Environment/Context- Style and Tone - Verbal and Non – Verbal Communication – Body Language

Extra Reading/Key Words: *Types of Corporate Communication*

UNIT II **9Hrs**

Listening

Pre Listening – knowing the content and context – predicting the text - Listening to a conversation - Listening to instructions - Listening to description

Extra Reading/Key Words: *Active Listening*

UNIT III **9Hrs**

Speaking

I, Me, Myself – Introducing self, the place I belong to, etc.- My Family

My Favourite things (Food, Movies, School, Friends) - My Aim (Goal Setting)

Extra Reading/Key Words: *Positive Self-image and Self Esteem*

UNIT IV **9Hrs**

Reading

Understanding what I read right - Spelling and Grammar - Reading Instructions

Reading Newspapers – SPELT Technique - Reading Magazines – Reports – Manuals

Extra Reading/Key Words: *Different types of Texts - Templates on reports, agreements & documents*

UNIT V **9Hrs**

Writing

From complex to simple writing – principle of good writing - Asking permission
Inviting - Writing for pleasure (blogs, poems, articles) a page from my autobiography, If I were the PM, Favourite things

Extra Reading/Key Words: *Effective Letter writing*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Overview of communication process and introduction to corporate communication	K1
CO-2	Listening skills – pre, while and post listening	K2
CO-3	Self-Introduction skills	K3
CO-4	The learners become effective in reading and understanding spelling and grammar	K3

(K1=Remember, K2=Understand, K3=Apply, K4=Analyz e, K5=Evaluate, K6=Create)TEXT

BOOKS

1. Courtland L. Bovee & Jhon V. Thill, Business Communication Today, 14th Edition. Pearsons
2. Shalini Varma, Body Language, Your Success Mantra, Second Edition, Books33

SUGGESTED READINGS

1. Norman Lewis, Word power Made Easy, 2015 Edition
2. Meenakshi Raman and Sangeets Sharma, Technical Communication, 2015 Edition
3. Wren and Martin, High School English Grammar
4. The Hindu and The New Indian Express

WEB REFERENCES

1. https://www.cambridgeenglish.org/learning-english
2. https://www.businessballs.com/
3. https://www.thoughtco.com/
4. https://ed.ted.com/

Note: Learners are advised to use latest edition of books.

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	L	H	H	M	M	H	H	L
CO-2	H	M	H	H	M	M	H	H	L
CO-3	H	M	H	H	M	M	H	H	L
CO-4	H	M	H	H	M	M	H	H	L

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	M	M	M
CO-2	H	M	M
CO-3	H	H	M
CO-4	M	M	M

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE 1- PROGRAMMING IN C
Total Hours	60
Hours/Week	4
Code	U21SD1MCT01
Course Type	Theory
Credits	4

CONSPECTUS

To understand the concepts of problem solving approaches and to develop programming skills using C language

COURSE OBJECTIVES

1. To understand the concepts of algorithms and create flowcharts for a given problem
2. To apply the basic concepts of C in real-time applications
3. To analyze the control constructs, different types of arrays and apply the concepts for solving problems in real time
4. To understand the concepts of strings, user defined functions, structures and union in C
5. To understand the basics of pointers and create files using C

UNIT I **15Hrs**

INTRODUCTION TO COMPUTER PROBLEM SOLVING

Introduction: Steps involved in Problem Solving Using Computers – Algorithms – Flow Charts –Pseudo code – Evolution of Programming Languages: Introduction – Classification of Programming Languages -Compiler–Interpreter, Loader and Linker.

Extra Reading /Keywords*: Develop Algorithms for real time applications.*

UNIT II **15Hrs**

CONSTANTS, VARIABLES, AND DATATYPES: Introduction–Character Set–C Tokens–Keywords and Identifiers – Constants– Variables– Data Types– Declaration of Storage Class.

OPERATORSANDEXPRESSIONS: Introduction-Arithmetic Operators-Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators-ConditionalOperators-BitwiseOperators-SpecialOperators-ArithmeticExpressions-Evaluation of Expressions - Precedence of Arithmetic Operators - Some Computational Problems. **MANAGING INPUT AND OUTPUT OPERATORS:** Introduction-Formatted Input-Formatted Output.

Extra Reading/Keywords*: Basic I/O and Control operations in C Language.*

UNIT III **15Hrs**

DECISION MAKING AND BRANCHING: Introduction - Decision Making with if Statement -Simple if Statement- The if else Statement - Nesting of if...else Statements - The Else if Ladder –Switch Statement-?: Operator –Go to Statement.

DECISIONMAKINGANDLOOPING: Introduction–The While Statement-The Do Statement–The for Statement-Jumps in Loops.

ARRAYS: Introduction– One-dimensional Array– Two-dimensional Arrays- Initializing Two-dimensional Arrays–Multi-dimensional Arrays.

Extra Reading/ Keywords*: Develop multidimensional array programs with Branching and looping constructs*

UNIT IV **15Hrs**

HANDLING OF CHARACTER STRINGS: Introduction - Declaring and Initializing String Variables-Arithmetic Operations on Characters-String-handling Functions-Table of Strings

USER DEFINED FUNCTIONS: Introduction - Definition of Functions - Function Declaration - Category of functions - No Arguments and No Return Values - Argument but No Return Values - Arguments with Return Values – No Arguments but Returns a Value – Functions that Return Multiple Values–Recursion.

STRUCTURESAND UNIONS: Introduction–Defining a Structure- Declaring Structure Variables – Accessing Structure Members - Structure Initialization -Arrays of Structures –Arrays Within Structures– Structures Within Structures-Structures and Functions– Unions.

Extra Reading/ Keywords*: Create Programs using functions, Structures and Unions*

UNIT V **15Hrs**

POINTERS: Introduction - Understanding Pointers - Accessing the Address of a Variable -Declaring and Initializing Pointers –Accessing a Variable through its Pointer - Chain of Pointers – Pointer Expressions-Pointers and Arrays-Pointers and Character Strings –Arrays of Pointers-Pointers to Functions–Pointers and Structures.

FILE MANAGEMENT IN C: Introduction - Defining and Opening a File - Closing a File -Input/ OutputOperations on Files - Error Handling during I/O Operations - Random Access to Files-Command Line Arguments.

Extra Reading/Keywords*: Implement the system and file concepts using Pointers.*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO- 1	Identify the basic concepts of the programming languages and Identify and Examine the effective ways to solve the problems	K1
CO- 2	Summarize and associate the correct identifiers, keywords, operators and control structures to solve the problem with reduced complexity and to promote reusability	K2
CO -3	Describe the problem, compare the appropriate pre-build functions, procedures and construct customized coding sequence to solve the problem effectively	K3
CO -4	Construct solutions to solve the real world problems and develop small to medium sized application programs to demonstrate professionally acceptable coding with performance standards	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

TEXT BOOKS

1. M.T. Somashekara, "Problem Solving with C", PHI Learning Private Limited, 2009.
2. E. Balagurusamy, "Programming in ANSIC", Seventh Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2017.

SUGGESTED READINGS

1. Brian W. Kernighan and Dennis M. Ritchie, **"**The C Programming Language**"**, Prentice Hall Publishing Company, 2006.
2. Deitel and Deitel, **"**C how to Program**"**, Seventh Edition, Pearson Education Pvt. Ltd., 2013.
3. R.G. Dromey, **"**How to Solve it by Computer**"**, Fifth Edition, Pearson Education Pvt. Ltd., New Delhi, 2007.
4. Kamthane, A.N., **"**Programming with ANSI and Turbo C**"**, Pearson Education Pvt. Ltd., New Delhi, 2006.
5. K R Venugopal, Sudeep R Prasad, **"**Mastering C**"**, Second Edition, McGraw Hill Education Private Limited, 2015.

WEB REFERENCES

1. https://www.guru99.com/c-programming-language.html
2. https://www.tutorialspoint.com/cprogramming/index.htm
3. https://www.freecodecamp.org/news/the-c-beginners-handbook/
4. https://www.programiz.com/c-programming
5. https://www.learn-c.org/

Note: Learners are advised to use latest edition of books.

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	M	M	M	L	H	H	M
CO-2	M	M	M	M	M	L	H	H	M
CO-3	H	H	H	M	M	L	H	H	M
CO-4	H	H	H	H	H	L	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	M
CO-2	H	M	M
CO-3	H	H	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE 2- PROGRAMMING IN C LAB
Total Hours	90
Hours/Week	6
Code	U21SD1MCP02
Course Type	Practical
Credits	3
Marks	100

CONSPECTUS

To write code and develop application programs using C for solving real time problems.

COURSE OBJECTIVES

1. To recall the syntax of control structures and solve problems using C
2. To Remember the syntax of looping statements and solve problems using C
3. To Create programs for arrays and strings using C
4. To Develop programs for Functions, Pointers and Structures in C
5. To Write programs for creating a file and perform I/O operation on files

EXERCISES

1. Control Statements
2. Loop Statements
3. Arrays (Searching and Sorting)
4. Strings
5. Functions and Pointers
6. Structure and Union
7. Dynamic Memory Allocation
8. Macros and File Handling

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recognize the basics of C Programming	K1
CO-2	Demonstrate the internal structure of the C Programming	K2
CO-3	Apply different Data type, Structures, functions, files and use them in programming to solve Computational Problems in the required Domain.	K3
CO-4	Evaluate the best logic and methods to solve the problems, develop programs and Tools for Solving Real time Problems.	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	H	H	H
CO-2	H	M	H	H	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	H	H	H	L	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	M	M	M
CO-2	H	M	H
CO-3	H	H	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE 3-MS- OFFICE AND UNIX LAB**
Total Hours	**60**
Hours/Week	**4**
Code	**U21SD1MCP03**
Course Type	**Practical**
Credits	**2**

CONSPECTUS

To make the students hands-on use of MS Office applications to carry out office work.

COURSE OBJECTIVES

1. Remembers and understands a word processor to create and organize documents
2. Understand a spreadsheet for calculation, graphing tools, pivot tables
3. Remembers and understands a slide show presentation software to develop slide-based presentations
4. Understand and analyse to create and manage simple database effectively and be able to create and modify simple Tables, Queries, Forms and Reports
5. Learn and understand the basic Unix commands and the concept of Shell Programming

EXCERCISES

1. Word Processing - MSWORD

a. Formatting Documents
b. Working with Tables and Columns
c. Working with Graphics
d. Creation of Mail Merge

2. Electronic Spread Sheet-MS Excel

a. Working and Formatting with Worksheet
b. Functions and Formulas
c. Working with Excel Graphics

3. Database Management System MS Access

a. Working with Table, Form and Report
b. Working with Queries

4. Presentation –MS Power Point

Create the Presentation using following concepts:

a. To change the appearance of slide and formatting the Slides
b. Slide Animation and Slide Transition

5. Basic Commands in UNIX

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following:
   (i) Interactive shell scripts
   (ii) Positional parameters
   (iii) Arithmetic
   (iv) if-then-fi, if-then- else-fi, nested if-else
   (v) Logical operators
   (vi) else + if equals elif, case structure
   (vii) while, until, for loops, use of break
4. Write a shell script to create a file. Follow the instructions
   (i) Input a page profile to yourself, copy it into other existing file;
   (ii) Start printing file at certain line
   (iii) Print all the difference between two file, copy the two files.
   (iv) Print lines matching certain word pattern

   1. Write shell script for-

   (i) Showing the count of users logged in,

   (ii) Printing Column list of files in your home directory

   (iii) Listing your job with below normal priority

   (IV) Continue running your job after logging out.

   2. Write a shell script to change data format. Show the time taken in execution of this script.

   3. Write a shell script to print files names in a directory showing date of creation & serial number of the file.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall the basic operations of word processing, spread sheet DBMS, Ms-Power Point, Unix commands and operations.	K1
CO-2	Demonstrate the various methods involved in word processing, spread sheet, DBMS, Ms-Power Point and Shell Programming	K2
CO-3	Apply the skills to manipulate and create word document, work on spread sheet to calculate and represent visually, develop aesthetic style shows, shell scripts.	K3
CO-4	Create and manage databases.	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	L	M	L	M	-	M	H	M
CO-2	M	M	M	L	M	-	H	H	M
CO-3	M	M	M	L	M	L	H	H	M
CO-4	H	H	H	L	M	-	H	M	L

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	H
CO-2	H	M	H
CO-3	H	M	H
CO-4	M	M	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**ALLIED 1-BASIC MATHEMATICS**
Total Hours	**60**
Hours/Week	**4**
Code	**U21SD1ALT01**
Course Type	**Theory**
Credits	**4**

CONSPECTUS

To get the basic knowledge to solve simple problems in matrix, Differentiation and graph theory and to acquire the knowledge of problem solving ability, understand the linear programming technique.

COURSE OBJECTIVES

1. Find the rank of a matrix, eigen values and corresponding eigenvectors of a given matrix;
2. Understand the definitions of graph, Walks, Paths and Circuits;
3. Enumerate the limits of functions, continuous function;
4. Discuss Trigonometrically transformation of functions;
5. Apply Simplex Method, Two Phase Simplex Method to solve problems in Linear Programming.

UNIT I MATRIX 12Hrs

Matrices – Rank of a matrix – Solving simultaneous linear equation in three unknowns using Elementary Operations method – Eigen values and Eigen vectors – Verification of Cayley Hamilton theorem.

Extra Reading /Keywords*:* *Fourier Transform*

UNIT II GRAPH THEORY 12Hrs

Graph – Finite and Infinite graphs – Incidence and Degree – Isolated vertex, pendant vertex and Null graphs. Paths and Circuits: Isomorphism – Sub-graphs – Walks, Paths and Circuits – Connected and disconnected graphs – Euler graphs.

Extra Reading /Keywords*:* *Vertex Colouring, The Bipartite Graph*

UNIT III CONTINUOUS FUNCTIONS 12Hrs

Limits – Continuous functions – Types of discontinuities.

Extra Reading /Keywords*:* *Optimization techniques, Neural Networks*

UNIT IV SUCCESSIVE DIFFERENTIATION 12Hrs

The nth derivatives of Standard result - Trigonometrically transformation of functions - Formation of equations involving derivatives - Leibnitz formula for the nth derivative of a product - Related problems.

Extra Reading /Keywords*:* *Tangents and Normal*

UNIT V LINEAR PROGRAMMING **12Hrs**

General LPP – Canonical and Standard Forms of LPP – The Computational Procedure – Simplex Method - Two Phase Simplex Method.

Extra Reading /Keywords*:* *Resource Optimization*

Note: Texts given in the Extra reading /Keywords must be tested only through Assignmentand Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO- 1	Recognize the basics of Matrix Operations, Graph theory and Continuous Functions.	K1
CO- 2	Demonstrate the Linear Programming problems using various techniques	K2
CO- 3	Use mathematical ideas to solve realworld problems.	K3
CO- 4	Analyze the concepts of Graph theories to demonstrate the transportation problems	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyz e, K5=Evaluate, K6=Cre ate)TEXT

BOOKS

1. Ancillary Mathematics, Vol.-I, 2009 Edition, S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy.
   UNIT I: Chapter 3- sec 3.2 – 3.4
2. Narsingh Deo, Graph theory with application to Engineering and Computer Science, Prentice Hall of India Pvt. Ltd. (2005)
   UNIT II Chapter 1 Section 1.1 – 1.5 & Chapter 2 Sections 2.1, 2.2, 2.4 – 2.6
3. M.K. Singhal and Asha Rani Singhal, A First Course in Real Analysis, R. Chand & Co. (1997).UNIT III Chapter 7 Sections 1-3, 8
4. T.K. Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt Ltd. (2004).
   UNIT IV: Chapter 3
5. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand and Sons Publishers, New Delhi, 1992.
   UNIT V: Chapter 3 (3.4, 3.5), Chapter 4 (4.1, 4.3 except Big-M Method)

SUGGESTED READINGS

1. P. Prem Kumar Gupta and D.S. Hira, **Operations research**, S. Chand (2000).
2. J.K. Sharma, **Operations Research Theory and Applications**, Macmillan India Ltd. (2000).
3. M.D. Raisinghania, **Ordinary and Partial Differential Equations**, S. Chand & Co. (2010).
4. M.L. Khanna, **Differential Equations**, Jai Prakash Nath and Co. (2004)
5. Devi Prasad **Advanced Calculus**, Prentice Hall of India Learning Pvt. Ltd. (2009).

Note: Learners are advised to use latest edition of books.

WEB REFERENCES

1. http://ee263.stanford.edu/notes/matrix-primer-lect2.pdf
2. https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf
3. https://www.whitman.edu/Documents/Academics/Mathematics/lewis.pdf
4. https://www.slideshare.net/infomaticaacademy/2-successive-differentiation
5. https://www.mathsisfun.com/calculus/continuity.html

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	L	M	-	-	H	H	H
CO-2	H	H	M	L	L	L	H	H	H
CO-3	H	H	H	H	M	M	H	H	H
CO-4	H	H	H	H	M	M	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	M
CO-2	H	M	H
CO-3	H	H	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**ALLIED – 2-FUNDAMENTALS OF COMPUTER SCIENCE**
Total Hours	**45**
Hours/Week	**3**
Code	**U21SD1ALT02**
Course Type	**Theory**
Credits	**3**

CONSPECTUS

To acquaint the students with the fundamental concepts of computers to understand its basic operations and examine the functions of various hardware and software components.

COURSE OBJECTIVES

1. To Learn the fundamental concepts of computers and identify the similarities and difference between human and artificial intelligence systems.
2. To classify the input/output devices and primary/secondary storage of computer.
3. To analyze the different hardware components and software programs used in development process.
4. To illustrate and familiarize the architecture of a computer system, data processing and internet technologies.
5. To categorize operating system based on its usage and infer its properties.

UNIT I BASICS OF COMPUTER & ITS EVOLUTION 9Hrs

Computers Everywhere - History and Evolution – **Classification** - Definitions, Concepts and Features – Applications of Computers – Similarities and Difference between Human and Computer - Representation of Data / Information.

Extra Reading /Keywords: *Binary Codes*

UNIT II INPUT & OUTPUT DEVICE 9Hrs

Components of a Computer System - **Input Devices** : Keyboard, Pointing Devices, Pen Input Devices, Video Input Devices. **Output Devices** ; Printers – Plotter – Video Display Terminal – Computer Output Microfilm. **Primary Storage and Secondary Storage Devices** : Auxiliary Storage/Secondary Storage - Magnetic Disk - Optical Disks - Flash Memory - USB Drives - Removable Hard Drives - Smart Cards - Optical Cards.

Extra Reading /Keywords: *Intel Pentium Processor*

UNIT III HARDWARE & SOFTWARE 9Hrs

Hardware: Computer Motherboard. Software: Types of Programming Languages -Types of Computer Software – System Management Programs – System Development Programs – Standard Application Programs.

Extra Reading /Keywords: *Online Compiler*

UNIT IV DATA PROCESSING & INTERNET 9Hrs

Data Processing & Data Processing Stages - Program Development Process - Evolution of Internet – Basic Internet Technologies – Types of Virus and Threads.

Extra Reading /Keywords: *Big Data Analytics*

UNIT V OPERATING SYSTEMS **9Hrs**

Overview of Operating System – Types of Operating System-Properties of Operating System**.**

Extra Reading /Keywords: *Parallel Processing*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Relate and analyze the fundamental Concepts of Computers, human intelligence and Artificial intelligence	K1
CO-2	Demonstrate the architecture of the computer system and Internet	K2
CO-3	Identify the area of implementing System program and application program in real time scenario.	K3
CO-4	Classify and examine the usage of input/output and storage devices to find a suitable component for enhanced performance of the system.	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyz e, K5=Evaluate, K6 **=Create)TEXT**

BOOKS

1. E. Balagurusamy, Computing Fundamentals and C Programming, Second Edition, 2017.
2. Pradeep K. Sinha, Priti Sinha, Computer Fundamentals, Sixth Edition, 2004.

SUGGESTED READINGS

1. Peter Norton, Introduction to computers, Sixth Edition, 2008.
2. V. Rajaraman, Neeharika Adabala, Fundamentals of Computers, PHI Learning Pvt. Ltd., Sixth Edition.2015
3. E. Balagurusamy, Fundamentals of Computers, McGraw Hill, 2009.
4. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
5. Reema Thareja, Fundamentals of Computers, Second Edition.2020

WEB REFERENCES

1. https://www.collegetutor.net/notes/Computer_Fundamentals_Notes
2. https://www.tutorialspoint.com/computer_fundamentals/computer_fundamentals_tutorial.pdf
3. http://en.univ-batna2.dz/sites/default/files/ang/files/introduction_to_computing.pdf
4. https://planningtank.com/computer-applications/data-processing
5. https://www.geeksforgeeks.org/types-of-operating-systems/

Note: Learners are advised to use latest edition of books.

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	L	M	M	M	M	H	H	H
CO-2	H	M	M	M	L	L	H	H	H
CO-3	H	H	M	M	M	M	H	H	H
CO-4	H	H	H	H	H	L	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	H	L
CO-2	H	M	L
CO-3	H	M	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	ENGLISH -PRACTICAL ENGLISH – II
Total Hours	45
Hours/Week	3
Code	U21SD2ENT02
Course Type	Theory
Credits	3

CONSPECTUS

Advanced understanding of Listening, Speaking, Reading & Writing

COURSE OBJECTIVES

1. Understand aspects of grammar and pronunciation;
2. Use effective listening techniques;
3. Speak clearly with proper Pronunciation;
4. Choose the right kind of material to read for research;
5. Know the components of high IMPACT writing.

UNIT-I: VOCABULARY **9Hrs**

Root – Prefix –Suffix – "word –wide –web" - Spelling rules - Homophones – Homonyms - Pronunciation

Extra Reading/Keywords*:* *Pronunciation and Enunciation*

UNIT-II: LISTENING **9Hrs**

Listening to the unsaid words and messages - Asking questions - Seeking Clarification-Summarizing - Listening Effectiveness Assignment

Extra Reading/Keywords*:* *Deep Listening*

UNIT-III: SPEAKING **9Hrs**

Speaking clearly and Pronunciation - The power of words and choosing them Right-Voice and Proxemics - Getting it right across cultures - Speaking Assignment

Extra Reading/Keywords*:* *Personal space and cultural practices*

UNIT-IV: READING 9Hrs

Appreciating different genres, styles, authors - Reading for Pleasure (Fiction – Novels, Short Story, Poem) - Reading for Inspiration (Autobiography, Self Help books) - Reading for Research - Identifying the right resources - Books, Periodicals, Magazines, newspaper - Reading off the Internet **Extra Reading/Keywords*:*** *Blogs and e-books*

UNIT-V: PERSUASIVE WRITING PROJECT **9Hrs**

Identify the Audience: Who am I writing to- what are their interests - **M**ission of the Message:

Identify the Purpose/Goal of the communication - **P**lan: Organizing thoughts – Creating structure – Choosing Flow - **A**ction: Write Right- Words – Grammar- Style – Tone – Getting Punctuation right - **C**heck: Edit -Rewrite- Simplify – Format - Preparing a pamphlet (e.g. Plastic free zones, Drug abuse) - Preparing an ad (e.g. Air purifiers, FMCG) - Writing an article (Dream Big, Be Positive) - Movie Review

Extra Reading/Keywords*:* *Different types of writing*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K4)
CO-1	Define and remember the concepts and the rules learnt	K1
CO-2	Describe and give examples of the concepts learnt	K2
CO-3	Practice the required skills to express oneself	K3
CO-4	Solve the challenges given to communicate better	K4

(K1= Remember, K2= Understand, K3= Apply, K4= Analyze)

TEXT BOOK:

Student Manual

BOOKS FOR REFERENCE:

1. English Communication by Madumitha Chakraborty et al , Macmillan Publications 2017
2. Business Communication by Courtland L. Bovee, et al , Pearsons 2018
3. High School English Grammar – Wren and Martin, 2017 edition
4. Word Power Made Easy – Norman Lewis, 2015 edition
5. The Hindu or The New Indian Express

WEBSITES FOR REFERENCE:

1 www.ThoughtCo.com
2 www.bbc.co.uk
3 learnenglish.britishcouncil.org/en
4 https://www.teachingenglish.org.uk/
5 www.businessballs.com
6 www.ted.com
7 www.inktalks.com

MAPPING

PO – CO MAPPING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	H	M	H	M	H	M	M	M	L
CO 2	H	M	H	M	H	M	M	M	L
CO 3	H	M	H	M	H	M	M	M	L
CO 4	H	M	H	M	H	M	M	M	L

PSO – CO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	M	L	L
CO 2	M	L	L
CO 3	M	L	L
CO 4	M	L	L

(For Candidates admitted in the academic year 2021-2022)

CourseTitle	MAJORCORE-4-DATASTRUCTURES AND ALGORITHMS
TotalHours	75
Hours/Week	5
Code	U21SD2MCT04
CourseType	Theory
Credits	5

CONSPECTUS

To understand the fundamental concepts of data structures and learn to develop algorithms.

COURSEOBJECTIVES

1. To learn the fundamental Concepts of Data Structures.
2. To understand the working principles of Queues and Linked Lists.
3. To study how to balance a Binary Search tree.
4. To understand of various sorting algorithms, including insertion sort, selection sort, merge sort,
5. Heap sort and quick sort.
6. To understand the concepts of Graphs and its terminologies.

UNIT-I INTRODUCTIONTODATASTRUCTURE **15Hrs**

Definitions–OverviewofDataStructures-ImplementationofDataStructures.**ARRAYS:** Definition – Terminology – One-dimensional Array: Operations on Arrays. **STACK:** Definition and Example –Representation of Stack: Implementing the Push and Pop operation – **APPLICATIONS:** Arithmetic Expressions **–** Polish Notation – Evaluation of Postfix Expression – Transforming an Infix Expression into Postfix.

Extra Reading/Key words: *two dimensional and multi-dimensional array concepts.*

UNIT-II QUEUES **15Hrs**

Representation of Queue using an Array– Enque and Deque Operations–Priority Queue using an array. **LINKED LISTS:** Representation of Linked list in memory – Traversing a Linked list-Inserting after a given node–Deleting the node following a given node.

Extra Reading/Keywords: *real time applications of Stacks & Linked Lists.*

UNIT-III TREES **15Hrs**

Binary Trees: Representing Binary Tree **-** Operations on Binary trees - Traversing Binary Tree – Binary Search Tree – Searching and Inserting in Binary Search tree.

Extra Reading/Keywords: *Tree Traversals, Binary Search Tree.*

UNIT-IVSORTING **15Hrs**

Insertion Sort-Selection Sort –Heap Sort-Quick Sort-Merge Sort–Shell Sort (C Implementation).

Extra Reading/Keywords: *Applications of Sorting Techniques.*

UNIT-VGRAPHS **15Hrs**

Introduction-Graph terminologies-Representation of Graphs: Set Representations–Linked Representations – Warshall's Algorithm – Shortest Path Algorithm – Dijkstra's Algorithm and Floyd's Algorithm**.**

Extra Reading/Keywords: *cyclic and a cyclic graph, shortest path.*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level
CO-1	Recall the concepts of Arrays, Stack, Queues and Linked List	K1
CO-2	Compare and associate Stack, Queues, various Linked Lists, binary tree traversal, the operations of binary tree and Sorting algorithms	K2
CO-3	Apply various data structures and operations in the real time projects.	K3
CO-4	Analyze various sorting algorithms and shortest path algorithms	K4

(K1=Remember, K2=Understand,K3=Apply,K4=Analyze,K5=Evaluate,K6=Create)

TEXTBOOKS

1. **SamantaD**,"**ClassicDataStructures"**,2005,PrenticeHallofIndiaPrivateLtd,NewDelhi.
   Unit –I,II,IV,V.
2. **Schaum's,"DataStructureswithC"**,2006,SecondEdition.
   Unit–I,II, III.

SUGGESTED READINGS

1. Ellis Horowitz, Sartaj Sahniand Dinesh Mehta, "Fundamentals of Data Structures in C++",University Press(India)Pvt. Ltd., Hyderabad, 2007.
2. Yashavant P. Kanetkar, "Data Structures Through C++", BPBPublications,2003.
3. A.Chitra and P.T.Rajan, Data Structures, Tata McGraw–Hill Publishing Company Limited, NewDelhi, 2006.
4. Ean Paul Tremblay and PaulG. Sorenson,An Introduction to Data Structures with Applications,Tata McGraw-Hill, Second Edition,2007.
5. S.E.Goodman and S.T.Hedetniemi,"Introduction to the Design and Analysis of Algorithms", Tata McGraw-Hill, International Edition, 1987.

WEB REFERENCES

1. https://beginnersbook.com/2018/10/data-structure-array/
2. https://www.tutorialspoint.com/data_structures_algorithms/stack_algorithm.htm
3. https://www.javatpoint.com/binary-search-tree
4. https://www.interviewbit.com/tutorial/sorting-algorithms/
5. https://www.geeksforgeeks.org/dijkstras-shortest-path-algorithm-greedy-algo-7/

Note: Learners are advised to use latest edition of books.

MAPPING

PO–CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	M	H	H
CO-2	H	M	H	H	H	L	M	H	H
CO-3	H	M	H	H	H	L	M	H	H
CO-4	H	H	H	H	H	L	H	M	M

PSO–CO

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	H	M
CO-2	H	H	M
CO-3	H	H	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE-5-WEB DEVELOPMENT TOOLS LAB
Total Hours	75
Hours/Week	5
Code	U21SD2MCP05
Course Type	Practical
Credits	3

CONSPECTUS

To get knowledge and practical skill to create dynamic web applications.

COURSE OBJECTIVES

1. Understand the concepts necessary to create Dynamic Web Applications;
2. Evaluate Several Alternatives in the Design of a Web Application;
3. Develop A Functional Web Application;
4. Comprehend and Propose Web Application Infrastructure;
5. Apply Code Reuse With Templates, Libraries, And Snippets;
6. Create effective and attractive web applications required for the project developments;

HTML5

1. Develop a web page for a Restaurant's Menu Card using tables.
2. Design a web page for your College displaying various courses using Lists and Frames.
3. Design an Online Application form for your College.

CSS 3

1. To illustrate CSS Border Style Properties
2. To illustrate CSS Border Image Properties.
3. To illustrate CSS Selector Properties.

JQUERY:

1. Write a program to display the Week Days.
2. Write a program to generate Date and Time in different format.
3. Write a program to Validate Age and Numeric Value.

PHP & MySQL:

1. Creating a simple PHP program using the concepts: Flow Control, Strings and Arrays, creating Functions.
2. FORM processing using PHP.
3. Connecting to MySQL from PHP, PHP MySQL Connectivity, Creating Databases and Tables with PHP Programs: Storing data and Retrieving data.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recognize the fundamental concepts of web technologies	K1
CO-2	Understand the syntax of different technologies used in web development	K2
CO-3	Apply different designing tools for developing interactive webpages	K3
CO-4	Examine the designing tools suitable for current scenario to solve real-time problems	K4

(K1=Remember,K2=Understand,K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	H	H	H
CO-2	H	M	H	H	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	H	H	H	L	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	M	M	M
CO-2	H	M	H
CO-3	H	H	H
CO-4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE-6- BASICS OF ACCOUNTING AND TALLY LAB**
Total Hours	**45**
Hours/Week	**3**
Code	**U21SD2MCP06**
Course Type	**Practical**
Credits	**1**

CONSPECTUS

To equip the students with the practical skills of Tally.

COURSE OBJECTIVES

1. Understand the concepts related to Accounting;
2. Construct Final Accounts with Adjustments;
3. Prepare accounts with inventory;
4. Prepare Cost Center & Cost Category;
5. Prepare Pricelist and order processing

EXERCISES

1. Subsidiary Books without Inventory
2. Debit Note & Credit Note
3. Accounts only
4. Final Accounts Without Adjustments
5. Final Accounts with Adjustments
6. Accounts with Inventory
7. Cost centre and Cost Category 1
8. Cost centre and Cost Category 2
9. Price List
10. Order processing

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall and recognize the basic operations related to a principles of accounting	K1
CO-2	Understand and construct the accounts using TALLY	K2
CO-3	Apply the concepts of accounts to prepare inventory, Cost Center Cost Category,Pricelist and order processing	K3
CO-4	Examine the suitable methods to prepare accounts for inventory,price list and order processing	K4

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

PO – CO MAPPING

CO/PO	PO 1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9
CO-1	H	L	M	M	M	-	M	H	H
CO-2	M	M	M	M	M	-	H	H	H
CO-3	H	M	H	M	M	L	H	H	H
CO-4	H	H	H	L	M	-	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	L
CO-2	H	M	M
CO-3	H	M	M
CO-4	H	M	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	ALLIED – 3-STATISTICS FOR DATA ANALYTICS
Total Hours	60
Hours/Week	4
Code	U21SD2ALT03
Course Type	Theory
Credits	4

CONSPECTUS

To understand the various methods of collection of data and representing them through diagrams and graphs. To analyze the test of significance for small and large samples**.**

COURSE OBJECTIVES

1. To Understand various methods of collection of data and representing them through graphs
2. To Analyze various distribution
3. To Understand different test of hypothesis
4. To Evaluate test statistic using various tests
5. To Analyze test of significance for large and small samples.

UNIT- I STATISTICS AND DATA ANALYTICS 12Hrs

INTRODUCTION TO DATA ANALYTICS: Role of statistics and the data analysis Process-

DESCRIPTIVE STATISTICS: Definition of Statistics – Statistics as Data – Collection of Data - Primary and Secondary data – Classification and tabulation of data- Diagrammatic and graphical representation of data.

Extra Reading /Keywords*:* *Measures of central tendency and dispersion*

UNIT- II RANDOM VARIABLES 12Hrs

Discrete and continuous random variable - cumulative distributive function - properties of distribution function - function of a random variable -two dimensional random variable - joint probability function - marginal probability distribution - conditional probability distribution -Independent random variables.

Extra Reading /Keywords*:* *Functions of random variables*

UNIT- III TEST OF HYPOTHESIS FOR LARGE SAMPLES 12Hrs

Large Samples– definitions, test of hypothesis – test for a specified mean- test for equality of two means – test for a specified proportion – test for equality of two proportions – test for specified standard deviation of the population– test for equality of two standard deviations –test of significance for correlation coefficient.

Extra Reading /Keywords*:* *Sampling from finite population*

UNIT-IVTEST OF HYPOTHESIS USING t AND F TEST 12Hrs

Small Samples- t Test: Uses of t - Test for a specified mean, Test of significance for the difference between two population means when population S.Ds are not known.

Small Samples- F Test:

Test of Equality of two population variances - Analysis of variance - one way and two way classifications.

Extra Reading /Keywords*:* *Null and Alternative hypothesis*

UNIT-V TEST OF HYPOTHESIS FOR CHI-SQUARETEST 12Hrs

Chi square Test – definition, additive property, Pearson's Statistics, Uses of Chi-square test- test of independence of attributes-test for a specified population variance.

Extra Reading /Keywords*:* *Application of regressions in data science*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level
CO-1	Recall various methods of collection of data and describe graphs.	K1
CO-2	Understand the various function of random variables, test statistics, the mean and the populations	K2
CO-3	Apply various tests of hypothesis for large and small populations.	K3
CO-4	Analyze various test for small and large samples and examine	K4

(K1=Remember, K 2 =Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6=Create)

TEXT BOOKS

1. Roxy Peck, Chris Olsen, Jay Devore, (2008) Introduction To Statistics And Data Analysis Process", Thomson Corporation, USA.
   UNIT I: Chapter 1(1.1, 1.2, 1.3)
2. Treatment and content as in Pillai R.S.N, Bagavathi .V (2007)STATISTIC, SChand and And Company, New Delhi UNIT I: Chapter 1, 2, 4,6,7,8
3. Treatment and content as in Vittal .P.R (2002), Mathematical Statistics, Margham Publishers, Chennai.
   UNIT II : Chapter 2
   UNIT III : Chapter 24 (omit page : 24.44– 24.55)
   UNIT IV: Chapter 25(Omit pages : 25.33 -25.45), Chapter 26
   UNIT V : Chapter 27

SUGGESTED READINGS

1. J.N. Kapur, H.C Saxena (2003), Mathematical Statistics, S. Chand and Company Ltd, New Delhi
2. S. G. Venkatachalapathy, Dr. H. Premraj (2015), Statistical Methods, Margham publications, Chennai

WEB REFERENCE

1. https://www.schoollearningresources.com/PDF/BasicsofStatistics.pdf
2. https://www.fd.cvut.cz/department/k611/PEDAGOG/THO_A/A_soubory/statistics_firstfive.pdf
3. https://www.cs.utah.edu/~jeffp/M4D/M4D-v0.4.pdf

Note: Learners are advised to use latest edition of books.

MAPPING
CO – PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	H	H	M	H	M	H	H	H
CO2	H	H	H	M	M	M	H	H	H
CO3	H	H	H	M	H	H	H	H	H
CO4	H	H	H	M	H	H	H	H	H

CO – PSO

	PSO1	PSO2	PSO3
CO1	H	M	M
CO2	H	M	M
CO3	H	H	H
CO4	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**ENGLISH: PRACTICAL ENGLISH- III**
Code	**U21SD3ENT03**
Course type	**Theory**
Semester	**III**
Hours/Week	**3**
Credits	**3**
Marks	**100**

CONSPECTUS

To understand the communication process and basics skills of Listening, Speaking, Reading &Writingand apply them in the work place scenarios and day-to-day lives

COURSE OBJECTIVES

The Learner will be able to

1. Define and remember the concepts and the rules learnt
2. Describe and give examples of the concepts learnt
3. Practice the required skills to express oneself
4. Solve the challenges given to communicate better
5. Evaluate the scenarios to offer achieve better communication channels
6. Write / prepare communication models according to the formats taught

UNIT I **9Hrs**

Errors and How to avoid them

Subject – verb agreement - Pronoun
Apostrophe - Comma splice
Sentence Fragments and Run-on Sentence

Extra Reading/Key Words: *Writing without errors*

UNIT II **9Hrs**

LISTENING

Listening to understand vs Listening to respond
Learning to summarize – Handling emotions when listening
Distractions to listening

Extra Reading/Key Words: *Levels of Listening*

UNIT III **9Hrs**

Speaking

Engaging the mind before the mouth – Why? What? When? Where? Who? How?

Speaking on the phone, Conference calls

3.3. Speaking in meetings

Extra Reading/Key Words: *Speaking skills- fluency, Vocabulary, Grammar, Pronunciation*

UNIT IV **9Hrs**

Reading

Reading and learning to summarize, abridge, abstract – Making a reading plan

Reading, recording and reviewing – Reading project

Book Review – Presentation and Report

Extra Reading/Key Words: *Reviews, summary, abstracts and excerpts, Fiction, Biographies, Autobiographies & Self – improvement books*

UNIT V **9Hrs**

Writing Approaches in Action through Email

Email, Messaging Written Communication – DO s and DON'T s

Emails – introducing- informing-thanking-following up – Emails – Asking, Replying-Summarizing/Reporting – Emails - sending wishes

Writing for the Social Media (LinkedIn Profile, replying, etc) – Writing to Peers- Bosses-Clients-Customers

Extra Reading/Key Words: *Writing for Social Media and networking on professional Social Media*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	**Course Outcomes**	**Cognitive Level (K1-K5)**
CO-1	Define and remember the concepts and the rules learnt	K1
CO-2	Describe and give examples of the concepts learnt	K2
CO-3	Practice the required skills to express oneself	K3
CO-4	Solve the challenges given to communicate better	K4
CO-5	Evaluate the scenarios to offer to achieve better communication channel	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

BOOK FOR REFERENCE

1. Business Communication Today by Corutl and Bovee- 14th edition, 2018
2. Technical Communication by Meenakshi Raman
3. Business Communication by Namitha Gopal
4. High School English Grammar – Wren and Martin
5. Word Power Made Easy – Norman Lewis
6. The Hindu, The New Indian Express, etc.

WEB REFERENCES

1. www.ThoughtCo.com
2. www.bbc.co.uk
3. learnenglish.britishcouncil.org/en
4. https://www.teachingenglish.org.uk/
5. www.businessballs.com
6. www.ted.com
7. www.inktalks.com

PO – CO MAPPING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	H	M	H	H	H	H	M	M	H
CO 2	H	M	H	H	H	H	M	M	H
CO 3	H	M	H	H	H	H	M	M	H
CO 4	H	M	H	H	H	H	M	M	H
CO-5	H	M	H	H	H	H	M	M	H

PSO – CO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	H	M	L
CO 2	H	M	L
CO 3	H	M	L
CO 4	H	M	L
CO-5	H	M	L

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE-7- JAVA PROGRAMMING**
Code	**U21SD3MCT07**
Course type	**Theory**
Semester	**III**
Hours/Week	**4**
Credits	**4**
Marks	**100**

CONSPECTUS

To understand the fundamentals of object-oriented programming concepts and its application in a Java environment.

COURSE OBJECTIVES

1. To understand the Java features and its expressions
2. To apply the concepts of classes, objects and methods
3. To implement the types of Inheritance & Package
4. To differentiate and demonstrate the types in Thread creation and Exception Handling
5. To understand and create applications with Applet Programming and Java Collection Framework.

UNIT I JAVA EVOLUTION **12Hrs**

Java History – Java Features – How Java Differs from C and C++ -- Java and Internet – Java and World Wide Web – Web Browsers – Hardware and Software Requirements – Java Support Systems – Java Environment.

OVERVIEW OF JAVA LANGUAGE

Introduction – Simple Java Program – More of Java – An Application with Two Classes – Java Program Structure – Java Tokens – Java Statements – Implementing a Java Program – Java Virtual Machine – Command Line Arguments – Programming Style.

TYPE CONVERSION IN EXPRESSION-DECISION MAKING AND BRANCHING:

Introduction – 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.

Extra Reading /Keywords: *Netbean, Eclipse*

UNIT II DECISION MAKING AND LOOPING **12Hrs**

Introduction – The While Statement – The do Statement – The for Statement – Jumps in Loops – Labeled Loops. **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.
Extra Reading /Keywords: *Generalization, Specialization*

UNIT III INTERFACES: MULTIPLE INHERITANCE **12Hrs**
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.
Extra Reading /Keywords: *Proxy, JAR Files*

UNIT IV MULTITHREADED PROGRAMMING **12Hrs**
Introduction – Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the 'Runnable' Interface-Inter thread communication.
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 Exceptions for Debugging.
Extra Reading /Keywords: *Deadlock, Synchronization*

UNIT V APPLET PROGRAMMING **12Hrs**
Introduction – How Applets Differ from Applications – Preparing to Write Applets – Building Applet Code – Applet Life Cycle – Creating an Executable Applet – Designing a 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-Event Handling-Introduction to AWT Package-Introduction to Swings-
JAVA COLLECTIONS: Overview of Interfaces-Overview of Classes-Overview of Algorithms.
Extra Reading /Keywords: *HTML5, Servlet*
Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Identify classes, objects, members of a class and relationships among them and understand abstraction, polymorphism needed for a specific problem	**K1**
CO-2	Understand and Apply encapsulation concepts in developing programs and develop exception handling and multithreaded applications with synchronization	**K2**
CO-3	Construct the packages with visibility control and design programs using different methods of thread creation	**K3**
CO-4	Design GUI based applications and develop applets for web applications implementing java collection	**K4**
CO-5	Construct Java Programs involving multithreaded programming, exception handling and applets with evaluating criteria	**K5**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PRESCRIBED TEXT BOOKS

E. Balagurusamy, **"Programming with JAVA"**, 2019, 6th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.
UNIT I: CHAPTERS 2, 3(3.1-3.2), 5.12& 6
UNIT II: CHAPTERS 7, 8
UNIT III: CHAPTERS 10, 11
UNIT IV: CHAPTERS 12, 13
UNIT V: CHAPTERS 14, 17

SUGGESTED READINGS

1. Yashavant P. Kanetkar, "**Let Us Java**", 2019, BPB Publications.
2. Herbert Schildt, **"Java The Complete Reference"**, 2017, 7th edition, Tata McGraw-Hill Publications Pvt. Ltd.
3. Y. Daniel Liang, **"Introduction to Java Programming and Data Structures"**, 2020, 12th edition, Pearson Education Ltd.
4. R. Nageswara Rao, "**Core Java: An Integrated Approach**",2016, Dream tech Press.
5. Herbert Schildt, "**Java A Beginner's Guide"**, 2020, 8th edition, Tata McGraw-Hill Publications Pvt. Ltd.

WEB REFERENCES

1. https://www.programiz.com › java-programming
2. https://www.w3schools.com › java › java_intro
3. https://www.javatpoint.com › java-tutorial
4. https://docs.oracle.com › docs › technotes › guides › language
5. https://www.geeksforgeeks.org › java

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	M	L	M	L	H	H	M
CO-2	H	M	M	M	M	L	H	H	M
CO-3	H	H	M	L	M	L	H	H	M
CO-4	H	H	M	M	M	L	H	H	H
CO-5	H	M	M	L	M	L	H	H	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE-8-COMPUTER NETWORKS**
Code	**U21SD3MCT08**
Course type	**Theory**
Semester	**III**
Hours/Week	**5**
Credits	**5**
Marks	**100**

CONSPECTUS

To impart knowledge on different layers of Computer Networks and its functionalities.

COURSE OBJECTIVES

1. To remembers and understands the basic concept of computer hardware and software
2. To understand the types of Transmission Media and remembers the working principles of Public Switched Telephone Network.
3. To examine functionalities of data link layer such as Error control and Flow control.
4. Analyze the routing and congestion control algorithms in network layer and to determine the protocols in transport layer
5. To identify and analyze the various services of application layer and the techniques in cryptography.

UNIT I **15Hrs**

INTRODUCTION-Uses of Computer Networks - Network Hardware - Network Software - Reference models OSI reference Model (TCP/IP reference Model, A comparison of the OSI and TCP/IP Reference Models).

Extra Reading/Keywords*: IoT interoperation across the OSI model.*

UNIT II **15Hrs**

PHYSICAL LAYER: Guided Transmission Media - Wireless Transmission - The Public Switched Telephone Network: Structure of the Telephone System – Trunks and Multiplexing - Switching.

Extra Reading/Keywords*: Mobile Telephone System*.

UNIT III **15Hrs**

DATA LINK LAYER: Data link Layer Design issues - Error Detection and Correction- Elementary Data Link Protocols - Sliding Window Protocols: A One-Bit Sliding Window Protocol**.**

Extra Reading/Keywords*: Orthogonal frequency division multiplexing (OFDM) Technique*

UNIT IV **15Hrs**

THE NETWORK LAYER: Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms.

THE TRANSPORT LAYER: The Transport Service (Services Provided to the Upper Layers, Transport Service Primitives) – Elements of Transport Protocols.

Extra Reading/Keywords*: Quality of Service (QoS)*

UNIT V **15Hrs**

THE APPLICATION LAYER- DNS - Domain Name System - Electronic Mail - The World Wide Web. NETWORK SECURITY: Cryptography - Symmetric Key Algorithms - Public Key Algorithms.

Extra Reading/Keywords*: Communication Security and Web Security*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and

Seminars.

COURSE OUTCOMES

The learners will be able to:

CO.No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the functionalities of Network hardware, Network software and protocols in various layer of OSI reference Model	K1
CO-2	Summarize and classify the working principles of Physical, Data Link, Network and the application layer.	K2
CO-3	Illustrate the mechanism of multiplexing, switching, error detection and correction and apply the suitable congestion control algorithm to solve routing issues and cryptographic algorithm to enhance security.	K3
CO-4	Analyze the issues in each layers of OSI reference model and the suitable routing and security algorithm to control congestion and to improve security.	K4
CO5	Evaluate the various cryptographic techniques suitable to solve security issues in network	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

TEXT BOOK

1. Tanenbaum Andrew. S| Wetherall, Computer Networks, 2013, Fifth Edition, Prentice-Hall India of India Pvt. Ltd.,New Delhi.

UNITI **:** Chapter 1 (1.1, 1.2, 1.3, 1.4.1, 1.4.2, 1.4.3)
UNITII **:** Chapter 2 (2.2, 2.3, 2.5 (2.5.1, 2.5.4, 2.5.5))
UNITIII **:** Chapter 3 (3.1 -3.4)
UNITIV **:** Chapter 5 (5.1, 5.2(5.2.1-5.2.8), 5.3)
Chapter 6 (6.1.1, 6.1.2), 6.2),

UNITV **:** Chapter 7 (7.1, 7.2, 7.3)
Chapter 8.1, 8.2, 8.3

SUGGESTED REFERENCES

1. Forouzan, "**Data Communications and Networking**",2017, Tata McGraw Hill Publishing Limited
2. Kurose James F. and Ross Keith W, "**Computer Networking**", 2017, Pearson Education.
3. Stallings William, **"Data and Computer Communications"**, 2017, Pearson Education
4. Brijendra Singh, **"Data Communication and computer Networks"**, 2014, Pearson Education.
5. P.K. Sing, **"Introduction to Computer Networks"**, 2020, V.K global publication limited.

Note: Learners are advised to use latest edition of books.

WEB REFERENCES

1. https://www.networkworld.com/article/3239677/the-osi-model-explained-and-how-to-easily-remember-its-7-layers.html
2. https://osi-model.com/physical-layer/
3. https://web.cs.wpi.edu/~rek/Nets2/C10/Data_Link_Layer_10.pdf
4. https://www.uobabylon.edu.iq/eprints/publication_4_20245_670.pdf
5. https://www.uobabylon.edu.iq/eprints/paper_9_19459_27.pdf
6. https://ptgmedia.pearsoncmg.com/images/9781587132087/samplechapter/1587132087_03.pdf

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	M	H	M	H	H	L
CO2	H	H	H	M	L	L	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	H	H	H

PSO – CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR ELECTIVE – 1 JAVA PROGRAMMING -LAB**
Code	**U21SD3MEP01**
Course type	**Practical**
Semester	**III**
Hours/Week	**4**
Credits	**3**
Marks	**100**

CONSPECTUS

To gain the knowledge to develop and create multiple web-based or server based applications in java to enhance the industrial competency.

COURSE OBJECTIVES

1. To recall the syntax, structure and concepts of Java programming language
2. To understand logical constructs for branching and loops as well as use of iterator objects
3. To develop applications with polymorphism through use of super-classes and interfaces
4. To design and implement custom checked and unchecked exception types
5. To create Enterprise based applications by encapsulating an application's business logic.

EXERCISES

1. Simple Programs.
2. Control Structures
3. Classes & Objects and Methods
4. Arrays
5. Interface
6. Inheritance
7. Packages
8. Multithreaded Programming
9. Exception Handling
10. Applets

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basics of Java Programming	K1
CO-2	Demonstrate the use of control structures, classes , objects and methods in Java Programming	K2
CO-3	Apply arrays, interfaces, inheritance, and packages to solve real time problems	K3
CO-4	Analyze the best logic and methods to solve the problems using multithreaded programming, exception handling and applets	K4
CO-5	Write application programs in Java evaluating the best suitable constructs, concepts and logic	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO 1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9
CO-1	H	H	H	H	H	L	H	H	H
CO-2	H	M	M	M	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	M	M	H	L	H	H	H
CO-5	H	M	H	H	H	L	H	M	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR SKILL BASED ELECTIVE 1-ANIMATION- LAB**
Code	**U21SD3SBP01**
Course type	**Practical**
Semester	**III**
Hours/Week	**2**
Credits	**1**

CONSPECTUS

To impart the skills in 2D and 3D animation by creating objects and adding special effects using Pencil 2D and Blender.

COURSE OBJECTIVES

1. To recall the concepts of 2D animation and 3D animation
2. To understand the tools and attributes used in 2D animation.
3. To design and implement various 2D animation effect using Pencil 2D
4. To develop 3D models, logo and scene using Blender.
5. To design 3D object and add animation effect to it

EXERCISES

Pencil 2D

1. Bouncing Ball
2. Birds on the Nest
3. Burning Candle
4. Moving Car
5. Shooting Gun
6. Rocket Launch

Blender

1. Creating 3D models
2. Creating a 3D Logo
3. Creating a 3D scene
4. Creating and animating 3D dices
5. Creating a 3D animation Game
6. Creating and animating a 3D Character

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basics of 2D and 3D animation	K1
CO-2	Demonstrate the use of various tools and attributes for designing object used for animation	K2
CO-3	Apply the special effects and movement to the object to create motion effect to the object.	K3
CO-4	Analyze the different tools, attributes and effects available to develop effective animation applications	K4
CO-5	Evaluate and find suitable animation tools to design real time animation applications	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	H	H	H	H	L	H	H	H
CO-2	H	M	M	M	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	M	M	H	L	H	H	H
CO5	H	H	M	M	H	L	H	H	H

PSO–CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	M
CO-2	H	M	M
CO-3	H	H	H
CO-4	H	H	H
CO5	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**NON MAJOR ELECTIVE-1- HTML AND JAVA SCRIPT-LAB**
Code	**U21SD3NMP01**
Course type	**Practical**
Semester	**III**
Hours/Week	**3**
Credits	**3**
Marks	**100**

CONSPECTUS

To design and develop dynamic websites using HTML and java script languages for real time applications.

COURSE OBJECTIVES

1. To recall the basic concepts of HTML and Java Script
2. To understand static and dynamic webpage using various tags in HTML and the syntax and semantics of Java Script
3. To apply the concepts of HTML and Java Script in Web page designing
4. To develop the web page based on event driven model
5. To design web pages with graphical user interface for various real-time problems

EXERCISES

1. Develop a HTML document and perform the basic alignments on the headers and format the document using suitable tags
2. Develop a HTML document to display the Chemical Equations
3. Develop a HTML document to display advantages and disadvantages of Internet using ordered and unordered Lists with tags facilities
4. Develop a Home Page for your Company with suitable name, logo, picture, background design and color text with links
5. Design a web page of your meals menu for a week using table tag with its attributes
6. Develop a Simple application by using frame controls
7. Develop a web page to display the resume Registration form with suitable controls
8. Develop a Java Script to compute the sum of an array of Integers
9. Develop a Java Script to perform multiplication and division of two numbers by getting from the user
10. Develop a Java Script reads the five integers and determines the largest and smallest in the group.
11. Develop a Java Script for a recursive function to calculate a Fibonacci value of a given number.

COURSE OUTCOMES

CO.No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basic tags of HTML and Java Script	K1
CO-2	Demonstrate webpage creation and Java Script applications	K2
CO-3	Apply different HTML and JavaScript concepts to design web pages for real time problems	K3
CO-4	Analyze and design web pages with graphical user interface and based on event driven model.	K4
CO-5	Write HTML and Java Script programs evaluating the best web designing concepts	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	H	H	H
CO-2	H	M	H	H	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	H	H	H	L	H	H	H
CO-5	H	M	H	H	H	L	H	M	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	**PRACTICAL ENGLISH – IV**
Total Hours	**45**
Hours/Week	**3**
Code	**U21SD4ENT04**
Course Type	**Theory**
Credits	**3**
Marks	**100**

CONSPECTUS

To understand the corporate communication models and basics skills of Listening, Speaking, Reading and Writing, and apply them in the work place scenarios and day-to-day lives

COURSE OBJECTIVES:

1. To understand the corporate communication models and Self analysis
2. To remember and apply the techniques of High Impact Presentation
3. To learn about common mistakes while using English and avoiding them
4. To learn and practice the dos's and don'ts of Group discussions for placement
5. To learn and prepare for job interview process

Unit I : Campus to Corporate **9Hrs**

Corporate Communication - Power dressing and grooming - Corporate Terms (advanced) - JOHARI window - SWOT analysis of the self

Extra Reading/Key Words: *Heuristic technique*

Unit II : High Impact Presentation **9Hrs**

PowerPoint and how to use it effectively - Using PowerPoint correctly - Delivering using PowerPoint - Other Presentation tools - Delivering in person vs on the phone vs video - Public Speaking Assignment - Micro Presentation – Video Mirroring

Extra Reading/Key Words: *Audience response systems*

Unit III: Common Writing Mistakes and How to Avoid Them **9Hrs**

The Wrong word - The Impotent Word - Common Grammatical errors - Indianisms and their unintended impact

Extra Reading/Key Words: *Malapropism*

Preparing for Placement – I

Resume - Cover Letter for Internship - Cover Letter for Job - Statement of Purpose

Extra Reading/Key Words: *Hard and soft skills*

Unit IV Preparing for Placement – II 9Hrs

Group Discussion (GD) & Evaluation Components - Roles in GD - Analysis of Topics - Handling different views - Controlling Emotions - Mock GD

Extra Reading/Key Words: *Types of Group Discussion*

Unit V Preparing for Placement – III **9Hrs**

Interviews & Evaluation Components - Different formats of Interviews - Handling conflicts – Practice - Mock Interview

Extra Reading/Key Words: *Assessing Strengths and Weaknesses*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

TEXT BOOK:

Student Manual

SUGGESTED READINGS

1.Technical Communication by Meenakshi Raman
2.Business Communication by Namitha Gopal
3.High School English Grammar – Wren and Martin
4.Body Language – Allan Pease
5.The Hindu, The New Indian Express, etc.

WEB REFERENCES

1. www.ThoughtCo.com
2. www.bbc.co.uk
3. learnenglish.britishcouncil.org/en
4. https://www.teachingenglish.org.uk/
5. www.businessballs.com
6. www.ted.com
7. www.inktalks.com

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level
CO-1	Understanding Self and introduction to corporate communication.	K1
CO-2	Use of technology in presentation	K2
CO-3	Write English correctly and Resume writing	K3
CO-4	Participate in group discussions	K4
CO-5	Attend interviews for placement	K5

(K1= Remember, K2= Understand, K3= Apply, K4= Analyze, K5-Evaluate)

PO – CO MAPPING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	H	M	H	H	H	H	M	M	H
CO 2	H	M	H	H	H	H	M	M	H
CO 3	H	M	H	H	H	H	M	M	H
CO 4	H	M	H	H	H	H	M	M	H

PSO – CO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	H	M	L
CO 2	H	M	L
CO 3	H	M	L
CO 4	H	M	L

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE – 11- DATABASE SYSTEMS
Total Hours	60
Hours/Week	4
Code	U21SD4MCT11
Course Type	Theory
Credits	4

CONSPECTUS

To impart the fundamental aspects of database design, database languages and database-system implementation.

COURSE OBJECTIVES

1. To understand fundamentals of database management system and its architecture.
2. To apply Structured Query Language to access data from database related to software industry.
3. To explore the basics of PL/SQL concept, functions and triggers used to solve problems.
4. To apply Normalization techniques to refine database to reduce software and hardware cost.
5. To analyze Transaction Processing and Concurrency Control mechanism in database system to secure the software.

UNIT-I: INTRODUCTION TO DBMS **12Hrs**

Introduction to Database Systems: Basic Concepts and Definitions - Data Dictionary -Database - Database System - Data Administrator - Database Administrator - **Database System Architecture**: Three-level ANSI-SPARC Data Base Architecture - Data Models

Extra reading/Keywords*:* *DB Software, Big Data*

UNIT-II: STRUCTURED QUERY LANGUAGE **12Hrs**

Relational Query Languages: Query Language – **Structured Query Language**: Advantages and Disadvantages of SQL- Basic SQL Data Structure - SQL Data Types - SQL Operators - Data Definition Language - Data Query Language - Data Manipulation Language - Data Control Language - Data Administration Statements - Transaction Control Statements.

Extra reading/Keywords*:* *PostgreSQL, Embedded SQL*

UNIT-III: PL/SQL PROCEDURE **12Hrs**

Procedural Language- SQL: PL/SQL Block Structure - PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor - Processing Explicit Cursor - Implicit Cursor - Exception Handlers – Sub Programs in PL/SQL - Functions - Precaution While Using PL/SQL Functions - Stored Procedure –DB Triggers - Object Oriented Technology

Extra reading/Keywords: PL/SQL Engine, Oracle Server

UNIT-IV: NORMALIZATION **12Hrs**

Introduction – Normalization - Normal Forms - BCNF – Multi-value Dependencies and 4NF – Join Dependencies and 5NF

Extra reading/Keywords*:* *6NF, ONF*

UNIT-V: TRANSACTION PROCESSING **12Hrs**

Transaction Processing and Concurrency Control: Introduction - Transaction Concepts - Concurrency Control - **Database Recovery System**: Database Recovery Concepts-Types of Database Failure-Types of Database Recovery.

Extra reading/Keywords*:* *Web Server, Transaction Processing Monitor*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recall and relate file management systems with DBMS and design relations using Database Schema	**K1**
CO-2	Understand the concepts data models, SQL Queries, PL/SQL procedures, normalization techniques and database recovery system	**K2**
CO-3	Apply normalization techniques to avoid data redundancy in databases and apply SQL queries and PL/SQL procedure to access the database.	**K3**
CO-4	Analyze the suitable normalization techniques to design a database schema for real-time database management problems.	**K4**
CO-5	Evaluate Concurrency Control methods to secure the data and assess the types of Database failures and Database Recovery to develop the software with integrity	**K5**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PRESCRIBED TEXT BOOKS

1. S.K. Singh, "Database Systems - Concepts, Design and Application", Pearson education, 2nd edition, 2013.
   Unit-I Chapter 1(1.1-1.7), Chapter 2(2.1-2.3, 2.7)
   Unit-II Chapter-5(5.4,5.5)
   Unit IV Chapter-10(10.1-10.6)
   Unit V Chapter-12(12.1-12.3), Chapter 13(13.1-13.5)

2. Rajesh Narang, "Database Management Systems", PHI Learning Private Limited, New Delhi, 2011
   Unit – III Chapter 10(Pages: 178-190), Chapter11 (Pages:191-222)

SUGGESTED READINGS

1. Abraham Silberscatz, Henry F. Korth and S. Sundhrasan, "**Database System Concepts**", 2019, Mc Graw Hill Publications Pvt. Limited.
2. Elmasri Ramez Navathe Shamkant, "**Fundamentals of Database System**", 2017, Pearson Education Publications.
3. Rajiv Chopra, "**Database Management System**", 2016, S. Chand Publications.
4. Seemakedar, "**Database Management System**", 2011, Technical Publications.
5. A. Hoffer Jeffrey, V. Ramesh, TopiHeikki, "**Modern Database Management**", 2017, Pearson Education Publications

WEB REFERENCES

1. https://www.oracle.com/in/database/what-is-database/
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.sciencedirect.com/topics/computer-science/database-systems
4. https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
5. https://www.ibm.com/docs/en/zos-basic-skills?topic=zos-what-is-database-management-system

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	M	L	M	L	H	H	M
CO-2	H	M	M	M	M	L	H	H	M
CO-3	H	H	M	L	M	L	H	H	M
CO-4	H	H	M	M	M	L	H	H	H
CO-5	H	H	M	M	M	L	H	H	H

PSO–CO MAPPING

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

Course Title	MAJOR CORE - 10 - DATABASE SYSTEMS LAB
Total Hours	60
Hours/Week	4
Code	U21SD4MCP10
Course Type	Practical
Credits	3

(For Candidates admitted in the academic year 2021-2022)

CONSPECTUS

To impart the fundamental aspects of database design, database-system implementation using techniques of database to create and work in database up to IT Industry standard.

COURSE OBJECTIVES

1. To understand to create table, aggregate functions, set operators using queries;
2. To provide practices to work with views;
3. To apply PL/SQL block to prepare mark sheet, pay slip, electricity bill;
4. To apply Triggers and functions in databases;
5. To implement an Inventory software with Oracle and MySQL.

EXERCISES

1. Table creation and simple queries, aggregate functions.
2. Queries using set Operators, various joins.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point
4. Nested sub queries and correlated sub queries.
5. Creating an employee database to set various constraints.
6. Write a PL/SQL block to prepare mark sheet.
7. Write a PL/SQL block to prepare a pay slip that handles all types of exceptions.
8. Write a PL/SQL block to prepare the electricity Bill to satisfy some conditions by accepting input from the user.
9. Creation of Procedures for student database
10. Creation of database triggers and functions for employee database

COURSE OUTCOMES

CO. No	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basics queries and aggregate functions	K1
CO-2	Demonstrate the use views, synonyms, sequence, nested queries and sub queries	K2
CO-3	Apply PL/SQL to various application domains	K3
CO-4	Analyze the best logic and methods to solve the problems using procedures	K4
CO-5	Write programs in PL/SQL using triggers and functions	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	H	H	H	H	L	H	H	H
CO-2	H	M	M	M	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	M	M	H	L	H	H	H
CO-5	H	M	H	H	H	L	H	M	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR ELECTIVE - 2 - AUGMENTED AND VIRTUAL REALITY LAB
Total Hours	60
Hours/Week	4
Code	U21SD4MEP02
Course Type	Practical
Credits	3

CONSPECTUS

To practice the concepts and technologies of Virtual and Augmented reality in Software applications.

COURSE OBJECTIVES

1. To understand the concepts & explore the current states of Virtual and Augmented Reality
2. To explore the technological options for consuming virtual &augmented reality experiences
3. To learn to create content for the VR and AR Projects
4. To explore specific applications built in virtual and augmented reality
5. To assess the near-future scenario for virtual and augmented reality

EXERCISES

1. Creating an account in Vuforia
2. Employee database creation
3. Adding license to the employee database
4. Manipulation of images
5. Augmented reality application for interior decoration
6. Augmented reality application for advertisement
7. Virtual reality – Displaying a message
8. Virtual reality – Displaying the output based on a condition
9. Virtual reality –Performing arithmetic operations and displaying the result
10. Virtual reality – Performing relational operations and displaying the result

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basics augmented and virtual reality	K1
CO-2	Demonstrate account creation in Vuforia and database creation	K2
CO-3	Apply augmented reality concepts by adding license	K3
CO-4	Analyze the best logic and methods to solve the problems using virtual reality	K4
CO-5	Assess virtual reality techniques for mathematical operations	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	H	H	H	H	L	H	H	H
CO-2	H	M	M	M	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	M	M	H	L	H	H	H
CO-5	H	M	H	H	H	L	H	M	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	ALLIED 5- ANDROID DEVELOPMENT LAB
Total Hours	60
Hours/Week	4
Code	U21SD4ALP05
Course Type	Practical
Credits	2

CONSPECTUS

To acquire knowledge and deploy Android Mobile applications in Android Platform.

COURSE OBJECTIVES

1. To understand the fundamentals of Android operating systems;
2. To understand and deploy Android development software tools;
3. To design and Develop an applications using Android programming concepts;
4. To develop various Android applications related to Layouts, Menus, Events and User Interfaces, content provider, maps;
5. To develop an Android application to Mobile with Server-less databases

EXERCISES

1. Creating **"**Hello world**"** Application.
2. Creating an application that displays message based on the screen orientation.
3. Create an application that displays custom designed Opening Screen.
4. Play an audio, based on the user event.
5. Create an UI with all views.
6. Create menu in Application.
7. Read/ write the Local data.
8. Create / Read / Write data with database (SQLite).
9. Create an application to send SMS.
10. Create an application to send an e-mail.
11. Display Map based on the Current/given location.
12. Learn to deploy android Applications.

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the fundamental concepts of mobile application using android programming.	K1
CO-2	Understand the syntax of Android programming used in mobile app development	K2
CO-3	Apply different designing tools and layouts for developing interactive mobile applications	K3
CO-4	Examine the designing tools suitable for current scenario to solve real-time problems using android based mobile applications	K4
CO-5	Evaluate the suitable tools to design interactive mobile applications	K5

(K1=Remember,K2=Understand,K3=Apply, K4=Analyze, K5- Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	H	H	H
CO-2	H	M	H	H	H	L	H	M	H
CO-3	H	M	H	H	H	H	H	H	H
CO-4	H	H	H	H	H	H	H	H	H
CO-5	H	H	H	H	H	H	H	H	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	NON-MAJOR ELECTIVE-2- GRAPHICS AND ANIMATION LAB
Total Hours	45
Hours/Week	3
Code	U21SD4NMP02
Course Type	Practical
Credits	3

GENERAL OBJECTIVE

To give basic knowledge on working of Pencil 2D to create an animation.

COURSE OBJECTIVES

1. To understand and learn the types of tools;
2. To learn and understand the working procedure of 2D;
3. To develop the animated image using pencil 2D;
4. To learn and understandthe tools to do the exercises;
5. To know and understand the main memory, auxiliary memory, associative, cache and virtual memory.

EXERCISES

1. Create and Animate a ball to bounce using Pencil 2D.
2. Create and Animate a stick man to walk using Pencil 2D.
3. Create and Animate the needle in wall clock using Pencil 2D.
4. Create and Animate the sun rise in sceneries using Pencil 2D.
5. Create and Animate the fish to swim in the river and boat to move using Pencil 2D.
6. Create and Animate the man to climb the mountain in Pencil 2D
7. Create and Animate the man to play the basketball in Pencil 2D.
8. Create and Animate the man to shoot the person and make the blood to shed in pencil 2D
9. Make any story and do animated work using Pencil 2D.

COURSE OUTCOMES

CO NO.	COURSE OUTCOMES	COGNITIVE LEVEL (K1-K5)
CO-1	Recognize the basics tools in Pencil 2D	K1
CO-2	Demonstrate the use of the animation tools	K2
CO-3	Apply the tools in creative manner.	K3
CO-4	Analyze the creative animation design.	K4
CO-5	Develop a story related animation in real time.	K5

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	H	H	H	H	L	H	H	H
CO-2	H	M	M	M	H	L	H	M	H
CO-3	H	M	H	H	H	L	H	M	H
CO-4	H	H	M	M	H	L	H	H	H
CO-5	H	M	H	H	H	L	H	M	H

PSO–CO MAPPING

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

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE -11- SOFTWARE ENGINEERING**
Code	**U21SD5MCT11**
Course type	**Theory**
Semester	**V**
Hours/Week	**4**
Credits	**3**
Marks	**100**

CONSPECTUS

To develop a broad understanding of the discipline of software engineering that enlightens the students to besuccessful professionals in the IT industry

COURSE OBJECTIVES

1. To Understand fundamental concepts of software process and its various process models
2. To Understand and infer the requirements engineering and Modeling
3. To Explore the design concepts and
4. To construct component level design and User interface design
5. To categorize and examine the testing strategies and its testing types.

UNIT I SOFTWARE AND SOFTWARE ENGINEERING **12Hrs**

The nature of software – Software Engineering–The software Process-Software EngineeringPractice-Software Myths.

SOFTWARE PROCESS: Generic process Model-Process assessment and Improvement-Personal and team process models.

PROCESS MODELS: Prescriptive models-The waterfall model – Incremental Process Models – Evolutionary Process Models-Concurrent models.

Extra Reading/Keywords*:* *Additional Process Models.*

UNIT II REQUIREMENTS ENGINEERING **12Hrs**

Requirements Engineering –Establishing the Ground work- – Eliciting Requirements-Building the requirements Model-Negotiating Requirements-Validating Requirements. **REQUIREMENTS MODELING:** Requirement analysis – Scenario-based modeling-UML Models – Data Modeling concepts

- Flow Oriented Modeling.

Extra Reading/Keywords*:* *XML Modeling.*

UNIT III DESIGN ENGINEERING **12Hrs**

Design within the context of software engineering – Design process – Design Concepts – Design Model.

CREATING AN ARCHITECTURAL DESIGN: Architectural styles and patterns – Mapping data flow into software architecture.**Extra Reading/Keywords*:*** *Other architectural designs.*

UNIT IV COMPONENT LEVEL DESIGN **12Hrs**

What is a component – Designing Class Based components – Conducting Component level design.

PERFORMING USER INTERFACE DESIGN: The golden rules – User-Interface analysis and Design-Interface analysis – Interface Design steps.

Extra Reading/Keywords*:* *Latest User Interface designs.*

UNIT V TESTING STRATEGIES **12Hrs**

Test strategies for Conventional Software – Validation testing – System testing – The art of debugging.

TESTING TACTICS: Software testing fundamentals – White Box Testing-Basis path testing-

Control Structure testing – Black Box testing.
Extra Reading/Keywords*:* *Overview of Testing Tools.*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall the basic principles of software engineering's specifications,designs, component levels, and testing methods.	**K1**
CO-2	Demonstrate the analysis of the requirements, the design, theprocess model, and the numerous testing techniques.	**K2**
CO-3	Identify the software design concepts and Build architectural, component level, and user interface models.	**K3**
CO-4	Examine the software process, Model, requirement specification andclassify various design analysis and testing strategies.	**K4**
CO-5	Evaluate and choose the Product, process and project metrics andestimation modeling based on emerging trends.	**K5**
CO-6	Adapt new software models, techniques and technologies to bringinnovative and novelistic solutions for the growth of the society in all aspects and evolve into continuous professional development.	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

TEXT BOOK

1. Pressman Roger. S, "Software Engineering-A Practitioner's Approach", 7th edition,2016, TataMcGraw Hill Publishing Company Ltd., New Delhi.

UNIT I: Chapter1 (1.1 to 1.6), Chapter2 (2.1 to 2.3.4&2.6),
UNIT II: Chapter5 (5.1 to 5.3,5.5-5.7), Chapter 6 (6.1 to6.4), Chapter 7(7.2)
UNIT III: Chapter8 (8.1 to 8.4), Chapter9 (9.3 and 9.6)
UNIT IV: Chapter10 (10.1 to 10.3), Chapter11 (11.1 to 11.4)
UNIT V: Chapter17 (17.3,17.6 to 17.8), Chapter18 (18.1,18.3-18.6),

SUGGESTED READINGS

1. Rajib Mall, "Fundamentals of software Engineering",2018, PHI Learning Private Ltd., NewDelhi.
2. Nasib Singh, "Software Engineering",2018, Khanna Publishing Pvt Ltd,New Delhi
3. Sangeeta Sabharwal, "Software engineering Principles and techniques,2nd Edition, New AgeInternational Publisher, New Delhi
4. Rohit Khurna, "Software engineering Principles and Practices",2nd Edition,Vikas PublishingHouse PVT limited, New Delhi.
5. Rogers S. Pressman, Bruce R. Maxim, "Software Engineering: A practitioner's Approach",8th Edition, Mcgraw Hill Education, New Delhi.

Note: Learners are advised to use latest edition of books.

WEB REFERENCES

1. https://www.tutorialspoint.com/software_engineering/index.htm
2. https://www.w3schools.in/sdlc/software-development-life-cycle-sdlc
3. https://www.javatpoint.com/software-engineering
4. https://software-engineering-books.com/
5. https://www.udemy.com/course/the-complete-software-engineering-from-basics-to- advanced/

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	H	L	H	M	H	H	L
CO2	H	M	M	L	M	M	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	M	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	M	H	H
CO6	H	M	H	H	H	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	M	H
CO2	H	M	H
CO3	H	M	H
CO4	H	H	H
CO5	H	M	H
CO6	H	M	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE 12: PROGRAMMING WITH PYTHON
Code	U21SD5MCT12
Course type	Theory
Semester	V
Hours/Week	4
Credits	4
Marks	100

CONSPECTUS

To understand and explore the fundamental and object-oriented concepts, Graphical User Interface using python programming to solve real-time computational problems

COURSE OBJECTIVES

1. To recognize the fundamentals of python programming and its application
2. To understand and develop the functions and Modules in Python and to manipulate operators the String using various function, and methods.
3. To examine various file operations and to explore the data structures List and Python.
4. To illustrate the various operations of dictionaries and to implement object-oriented Concepts using python.
5. To apply the exception handling mechanism to handle run time errors and to develop Graphical user interface and simple Graphics.

Unit I **12Hrs**

Basics of Python Programming - Features and History of Python-Writing and Executing First Python Program-Literal Constants -Variables and Identifiers-Data Types-Input Operation-Comments-Reserved Words-Indentation-Operation and Expressions-Expressions in Python-Operations on String-Other Data Types-Type Conversation. **Decision Control Statement**-Selection/Conditional Branching Statement-Basic Loop Structure/Iterative Statements-Nested Loop-break, Continue and pass Statement-else Statement used with Loops.

Extra Reading (Keywords): Boolean Operators.

Unit II **12Hrs**

Functions and Modules-Function Definition-Function Call-Variables Scope and Lifetime-The Return Statement-More on Definition Functions-Lambda Function-Documentation String-Good Programming Practices-Recursive Function-Modules-Packages in Python-Standard Library Modules-Global (), Local ()and Reload ()-Function Redefinition.

Python String Revisited: Concatenating, Appending, and Multiplying String-String are Immutable-String Formatting Operator-Built-in String Methods and Function-Slice Operation-ord() and chr() function-in andnot in Operators-Comparing String-Iterating String-The String Module.

Extra Reading (Keywords): Tkinter and Turtle Package

Unit III **12Hrs**

File Handling-Introduction-File Path-Types of File-Opening and Closing Files- Reading and Writing Files-File Position-Renaming and Deleting Files.

Data Structures-Sequence-Functional Programming-Tuple-Sets

Extra Reading (Keywords): Directory Methods, Hash File

Unit IV **12Hrs**

Dictionaries-Classes and Objects-Class Method and self-Argument- The_init_() Methods-Class Variables and Object Variables-The _del_() Method-Other special Methods-Public and Private Data Members-Private Methods-Calling a Class Method from Another Class Method-Built-in Functions-Class Attributes-Garbage Collection-Class Methods-Static Methods-**Inheritance** : Inheriting Classes in Python-Types of Inheritance-Composition-Abstract Classes and Interfaces.

Extra Reading (Keywords): Metaclass

Unit V **12Hrs**

Error and Exception Handling: Handling Exception-Multiple Except Blocks-Multiple Exception in a Single Block-Except Block Without Exception-The Else Clause-Raising Exception-Instantiating Exception-Handling Exception in Invoked Function-Built-in and User-defined Exceptions-The Finally Block-Pre-Defined Clean-up Action-Re-raising Exception-Assertions in Python-**Multi-threading-GUI Programming with tkinter Package-Simple Graphics Using Turtle.**

Extra Reading (Keywords): plotting Graph in Python

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall and relate the fundamental concepts of python to solve computational problems.	K1
CO-2	Understand the functionalities of modules, packages and list, tuples, dictionaries data structures and handling Exceptions.	K2
CO-3	Apply the data structures such as list, Tuples, dictionary and error handling mechanism for real time problems.	K3
CO-4	Analyze the various functions and object-oriented concepts that is suitable to solve the given computation problems.	K4
CO-5	Determine the most effective programming solutions that assist to solve the social and industrial issues.	K5
CO-6	Develop a Python project related to sustainable development goals.	K6

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

TEXT BOOKS

1. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University press, 2017.
   UNIT 1- CHAPTER 3(3.1-3.16), CHAPTER 4(4.1-4.8)
   UNIT II- CHAPTER 5(5.1-5.15), CHAPTER 6(6.1-6.10)
   UNIT III- CHAPTER 7(7.1-7.7), CHAPTER 8(8.1-8.4)
   UNIT IV- CHAPTER 8(8.5,8.6-8.6.12), CHAPTER 9(9.1-9.15)
   UNIT V- CHAPTER 12(12.1-12.14), page 508-524

SUGGESTED READINGS

1. Peter D. Kazarinoff, "Problem Solving with Python 3.7 Edition" A beginner's guide to Python& open-source programming tools Paperback – Import, 15 September 2019.
2. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, PearsonEducation India, 2015.
3. Ashok Namdec Kamthane, Ait Ashok Kamthane, "Problem Solving and Python Programming", McGraw Hill Education (India) Private Limited, Chennai.
4. Jeffrey Elkner, Chris Meyers Allen Downey, Learning with Python, Dreamtech Press, 2015
5. Sheetal Taneja, Naveen Kumar**, "**Python Programming a Modular Approach**",** Pearson,2017

Note: Learners are advised to use latest edition of books.

WEB REFERENCES

1. https://cfm.ehu.es/ricardo/docs/python/Learning_Python.pdf
2. https://bugs.python.org/file47781/Tutorial_EDIT.pdf.
3. https://cfm.ehu.es/ricardo/docs/python/Learning_Python.pdf
4. https://static.realpython.com/python-basics-sample-chapters.pdf
5. https://runestone.academy/ns/books/published/pythonds3/index.html

PO – CO MAPPING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1	H	M	M	M	L	L	M	M	M
CO 2	H	M	M	M	M	M	H	H	M
CO 3	H	H	H	M	M	M	H	H	H
CO 4	H	H	H	M	M	M	H	H	H
CO 5	H	H	H	H	H	H	H	H	H
CO 6	H	H	H	H	H	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	M	M	L
CO 2	M	M	M
CO 3	H	H	M
CO 4	H	H	M
CO-5	H	H	H
CO-6	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE-13 PYTHON PROGRAMMING- LAB**
Code	**U21SD5MCP13**
Course type	**Practical**
Semester	**V**
Hours/Week	**4**
Credits	**4**
Marks	**100**

CONSPECTUS

To understand and implement the Python programming concepts to solve various real-time applications.

COURSE OBJECTIVES

1. To understand and apply python data types, operators to compute problems.
2. To apply the control structures and numerous data types with their methods to develop programs
3. To design user defined functions, modules, packages and exception handling methods to solve problem and handle errors in applications.
4. To explore and use Object Oriented Programming Concepts in Python programming.
5. To create database and implement CRUD operation in the database

Implementation of the following Concepts

1. Python Program for factorial of a number
2. Python Program to find sum of array
3. Python program to check if a string is palindrome or not
4. Python program to find N largest elements from a list
5. Python | Reversing a List
6. Break a list into chunks of size N in Python
7. Python Sort the values of first list using second list
8. Python program to multiply two matrices
9. Python program to split and join a string
10. Replace all occurrences of a substring in a string
11. Python program to sort list of dictionaries by values in Python – Using itemgetter
12. Python program to sort list of dictionaries by values in Python – Using lambda function
13. Check if binary representations of two numbers are anagram
14. Counting the frequencies in a list using dictionary in Python

15. Convert a list of Tuples into Dictionary
16. Python – Maximum and Minimum K elements in Tuple
17. Python – Adding Tuple to List and vice – versa
18. Python program to Order Tuples using external List
19. Python – Extract digits from Tuple list
20. Python Program for Binary Search and Python Program for Linear Search
21. Sort, bubble sort, quick sort, selection sort and merge sort.
22. Python Program to print an Inverted Star Pattern
23. Python program to convert time from 12 hour to 24-hour format
24. Convert date string to timestamp in Python
25. Python – Get number of characters, words, spaces and lines in a file
26. Python Program to merge two files into a third file
27. Python program using classes and objects
28. Python program using inheritance and modules.

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall and relate fundamental concepts of python programming with other programming language	**K1**
CO-2	Understand the list, tuples and dictionary data structures to solve computation problems	**K2**
CO-3	Apply the Python datatypes, data structures, function and modules to design python applications.	**K3**
CO-4	Analyze the data structures and python packages to solve various real time problems	**K4**
CO-5	Determine the suitable python data structure and object-oriented concepts to design effective python applications	**K5**
CO-6	Build a Python application for solving the issues related to sustainable development goals.	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

PO-CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	H	L	M	M	M	M	L
CO2	H	M	M	L	M	M	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	M	H	H
CO6	H	M	H	H	H	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	M	M
CO2	H	M	M
CO3	H	H	H
CO4	H	H	H
CO5	H	H	H
CO6	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	MAJOR CORE – 14- OPERATING SYSTEMS
Code	U21SD5MCT14
Course type	Theory
Semester	V
Hours/Week	4
Credits	3
Marks	100

CONSPECTUS

To enable the students to learn the concepts of operating system, the policies for scheduling, deadlocks, memory management, synchronization, system calls and file systems.

COURSE OBJECTIVES

1. To understand operating system and its structures;
2. To understand the process synchronization and Process scheduling.
3. To identify various deadlock handling methods and construct the mechanism fordeadlock prevention, avoidance and detection;
4. To Infer the concept of memory management and virtual memory;
5. To analyze the file system, memory management, and allocation procedureswhile describing synchronization.

UNIT I INTRODUCTION **12Hrs**

What Operating System Do-Computer System Organization-Computer System Architecture-Operating System Structure-Operating System Operations-Process Management-Memory Management-Storage Management.

SYSTEM STRUCTURES: System Calls-Types of System Calls.

Extra Reading /Keywords: *Finding the evolution of computer system.*

UNIT II PROCESSE CONCEPT **12Hrs**

Process Concept – Process Scheduling – Operation on Processes – Cooperating Processes – Interprocess Communication. **MULTITHREADED PROGRAMMING:** Overview – Multithreading Models - Threading Issues. **PROCESS SCHEDULING:** Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple–Processor Scheduling – Real-Time Scheduling.

Extra Reading /Keywords: *Calculating waiting time, turnaround time and response time for all the scheduling Algorithms.*

UNIT III SYNCHRONIZATION **12Hrs**

Background - The Critical-Section Problem – Semaphores – Classic Problems of Synchronization. **DEADLOCKS:** System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

Extra Reading /Keywords: *Finding the real time examples in deadlock.*

UNIT IV MEMORY MANAGEMENT **12Hrs**

Background – Swapping -Contiguous Memory Allocation -Segmentation -Paging.

VIRTUAL MEMORY: Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

Extra Reading /Keywords: *Calculating page fault and comparing which page replacement algorithm is the best one.*

UNIT V FILE-SYSTEM **12Hrs**

File Concept – Access Methods – Directory and Disk Structure – File System Mounting – File Sharing.

FILE-SYSTEM IMPLEMENTATION: File-System Structure – File System Implementation - Directory Implementation – Allocation Methods – Free-Space Management –Efficiency and Performance – Recovery.

Extra Reading /Keywords: *Comparing the allocation methods*.

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Relate the various types of operating systems.	**K1**
CO-2	Recognize the procedures for process management with scheduling of synchronization and file management processes.	**K2**
CO-3	Compute system structure, process scheduling, deadlocks and construct page replacement in virtual memory, and disc seek time in scheduling methods.	**K3**
CO-4	Analyze various scheduling concepts, deadlock avoidance, prevention and recovery mechanism and examine the effective memory and file system management techniques.	**K4**
CO-5	Evaluate the requirement for process synchronization and coordination handled by operating system and recommend the suitable memory management process to solve the memory issues.	**K5**
CO-6	Conclude with a comprehensive understanding on Linux kernel.	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate,K6= Create)

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, **Operating System Concepts,** 2016,Ninth Edition, John Wiley & Sons Publications Inc., Singapore.

UNIT I: Chapters 1((1.1-1.8), 2(2.3,2.4)
UNIT II: Chapters 3(3.1 – 3.4), 4(4.1,4.3& 4.6), 5(5.1 - 5.3,5.5&5.6)
UNIT III: Chapters 6(6.1 ,6.2&6.6-6.7), 7(7.1-7.7)
UNIT IV: Chapters 8(8.1-8.5),9(9.1 – 9.6)
UNIT V: Chapters 10(10.1-10.5) ,11(11.1-11.7)

SUGGESTED READINGS

1. Deitel Harvay M., **Operating Systems**, 2011, Pearson Education Publications, Singapore.
2. Godbole Achyut S., **Operating Systems**, 2013, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. Milan Milankovic, **Operating System-Concepts and Design**, 2013, Tata McGraw-Hill Publishing Company Limited, New Delhi.
4. Tanenbaum Andrew S. & Woodhull Albert S., **Operating Systems – Design and Implementation**, 2012, Pearson Education Publications, Singapore.
5. William Stallings, **Operating Systems – Internals and Design Principles**, 2013,Pearson Education Publications, Singapore.

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	M	H	M	H	H	L
CO2	H	H	H	M	L	L	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	H	H	H
CO6	H	M	M	H	H	H	M	L	L

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	H	L
CO2	H	M	L
CO3	H	H	H
CO4	H	H	H
CO5	H	M	H
CO6	H	M	M

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR CORE – 15 CLOUD COMPUTING**
Code	**U21SD5MCT15**
Course type	**Theory**
Semester	**V**
Hours/Week	**4**
Credits	**3**
Marks	**100**

CONSPECTUS:

To understand the concepts of cloud computing technology services and to analyze the importance of virtualization mechanism and security needed for cloud based real-time applications.

COURSE OBJECTIVES

1. To remember the deployment and service models;
2. To understand the various technologies and cloud security fundamentals.
3. To analyze various concepts of virtualizations in cloud computing.
4. To determine the data security concept with respect to different cloud providers;
5. To illustrate the various cloud-based applications.

UNIT I UNDERSTANDING CLOUD COMPUTING **12Hrs**

Origins And Influences - Basic Concepts and Terminology - Goals and Benefits. **FUNDAMENTAL CONCEPTS AND MODELS:** Roles and Boundaries - Cloud Characteristics - Cloud Delivery Models - Cloud Deployment Models.

Extra Reading /Key words:*Cloud Enabling Technology*

UNIT II **12Hrs**

Logical Network Perimeter – Virtual Server – Cloud Storage Device – Cloud Usage Monitor. **SPECIALIZED CLOUD MECHANISMS:** Automated Scaling Listener – Load Balancer – SLA Monitor – Pay-Per Use Monitor – Audit Monitor
– Failover System .

Extra Reading /Key words: *Multi Device Broker*

UNIT III **12Hrs**

Basic Terms and Concepts-Threat Agents - Cloud Security Threats.

CLOUD SECURITY MECHANISMS: Encryption -Hashing- Digital Signature – Public Key Infrastructure-Identity and Access Management – Single Sign On – Cloud Based Security Groups – Hardened Virtual Server Images.

Extra Reading /Key words: *Security Policy Disparity.*

UNIT IV **12Hrs**

FUNDAMENTAL CLOUD ARCHITECTURES: Workload Distribution Architecture – Resource Pooling Architecture – Dynamic Scalability Architecture – Elastic Resource Capacity Architecture – Service Load Balancing Architecture – Cloud Bursting Architecture – Elastic Disk Provisioning Architecture. **ADVANCED CLOUD ARCHITECTURES:** Hypervisor Clustering Architecture – Load Balanced Virtual Server Instances Architecture – Cloud Balancing Architecture.

UNIT V **12Hrs**

CLOUD PROVIDER PERSPECTIVE OF CLOUD DELIVERY MODELS: Building IaaS Environments – Equipping PaaS Environments – Optimizing SaaS Environments. **CLOUD CONSUMER PERSPECTIVE OF CLOUD DELIVERY MODELS:** Working With IaaS Environments – Working With PaaS Environments – Working With SaaS Services.

Extra Reading /Key words: *Cost Metrics and Pricing Models*

Note: Texts given in the Extra reading /Key words must be tested only through Assignmentand Seminars.

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Recall and relate the fundamental concept, process, security and application in cloud.	**K1**
CO-2	Examine distributed data storage, virtual machines, and other cloud-enabling technologies.	**K2**
CO-3	Identify the cloud enabling technology, Virtual Machine Provisioning, data storage concepts for the real-time issues.	**K3**
CO-4	Analyze the suitable Virtual machine migrations services and data Security concepts for real-time applications.	**K4**
CO-5	Decide the suitable cloud infrastructure comprising of cloud models, cloud enabling technology, cloud storage and security to design an effective cloud based applications	**K5**
CO-6	Develop a cloud application to solve the real-time problems related to sustainable development goals	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

TEXT BOOKS

1. Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, **"Cloud Computing: Concepts, Technologyand Architecture"**, Prentice Hall, U.S.A., 2013.

UNIT I : Chapters 3 & 4

UNIT II : Chapters 5 & 6

2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, **"Cloud Computing: Principles and Paradigms",** John Wiley & Sons, U.S.A., 2013.

UNIT III : Chapter 5 (5.1to 5.4, 5.6)

UNIT IV : Chapter 8 (8.1 – 8.4)

3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "**Mastering Cloud Computing"**, ElsevierInc., 2013.

UNIT V: Chapter 5

SUGGESTED READINGS

1. Michael J. Kavis, **"Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)"**, John Wiley & Sons Inc.,Jan 2014.
2. Michael Miller, **"Cloud Computing Web Based Applications That Change the You Work and Collaborate Online"**, Pearson Education, 2009.
3. Kris Jamsa, **"Cloud Computing"**, Jones and Bartlett Learning, 2013.
4. Swarup K. Das, **"Cloud Computing"**, Dominant Publishers, 2015.
5. Prasanta Pattnaik, Manas Kabat **"Fundamentals of Cloud Computing"**, S.Chand (G/L)& Company Ltd; First edition, 2014.

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	M	L	L	M	M	L
CO2	H	M	M	M	M	M	H	H	M
CO3	H	H	M	M	H	M	H	H	H
CO4	H	H	M	M	H	H	H	H	H
CO5	H	H	H	M	M	H	H	H	H
CO6	H	H	H	H	H	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	M	L
CO2	H	M	L
CO3	H	H	H
CO4	H	H	H
CO5	H	H	H
CO6	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR ELECTIVE-3- C# AND .NET PROGRAMMING- LAB**
Code	**U21SD5MEP03**
Course type	**Practical**
Semester	**V**
Hours/Week	**4**
Credits	**3**
Marks	**100**

CONSPECTUS

To obtain overall view of C#.NET technologies and to design effective web applications.

COURSE OBJECTIVES

1. To Understand fundamental concepts of .NET using the .NET framework
2. To explore object-oriented techniques to design user interface.
3. To design .NET applications with Delegates & events, generics, handling exceptions,collections and classes.
4. To design and implement real time distributed applications using .NET platform.
5. To create simple web applications and windows applications for real-time scenario.

EXERISES

C#:

1. Simple Computations
2. Classes and methods
3. Constructors with parameters
4. Pass by values and pass by reference
5. Arrays
6. Structures
7. Enumerator
8. Jagged arrays
9. Method Overloading
10. Static Members
11. Operator Overloading
12. Inheritance
13. Virtual Methods
14. Abstract Class
15. Indexers
16. Delegates and Events
17. Interface
18. Exception Handling
19. Generic Method

.NET:

Simple Programs using C#.Net

1. Calculator Applications
2. Program for profile creation
3. Student Mark Details
4. Electricity bill preparation

Advanced Programs using C#.NET

1. Notepad creation using Menu strip controls and Dialog box
2. Windows Application with Database Connectivity using C# andADO.NET
3. Web Application with Database Connectivity using C#, ASP.NET andADO.NET

COURSE OUTCOMES

The learners will be able to:

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO-1	Remember the fundamental concepts of programming .Net framework	**K1**
CO-2	Understand Classes & objects, properties & methods, object-oriented techniques.	**K2**
CO-3	Apply the concepts of delegates & events, generics, handling exceptions, collections classes to design user interfaces	**K3**
CO-4	Examine the suitable techniques in C#.Net to implement complex windows applications	**K4**
CO-5	Evaluate the C#.Net features to implement effective real time distributed web applications.	**K5**
CO-6	Create simple web applications and windows applications using C#, ASP.NET and ADO.NET	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	M	H	M	H	H	M
CO2	H	H	H	M	L	L	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	H	H	H
CO6	H	H	H	H	H	M	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	H	L
CO2	H	M	L
CO3	H	H	H
CO4	H	H	H
CO5	H	M	H
CO6	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**MAJOR SKILL BASED ELECTIVE-2- DATA ANALYTICS-LAB**
Code	**U21SD5SBP02**
Course type	**Practical**
Semester	**V**
Hours/Week	**2**
Credits	**1**
Marks	**100**

CONSPECTUS

To learn Excel Data Sheet to do routine and specialized data analysis validation techniques.

COURSE OBJECTIVES

1. To understand the fundamental concepts of Data creation and Chart preparation.
2. To explore the various data report techniques
3. To apply the concepts of filter and sorting functions.
4. To implement Basic data validation techniques and statistical data manipulation.
5. To analyze and implement the Advanced Statistical function.

EXCERCISES

1. Creation of student mark list
2. Chart preparation
3. Sales data report
4. Preparation of salary sheet
5. Using filter option
6. Text to columns
7. Pivot table
8. Sorting
9. Birth calculation
10. Data validation
    1. Using group, ungroup and subtotal function
    2. Statistical function

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K6)
CO1	Recall the fundamental concepts of various data format and data chart	**K1**
CO2	Understand the Excel formulas used for data analysis and data reports	**K2**
CO3	Apply the data analysis and data validation techniques for a variety ofapplication's data.	**K3**
CO4	Analyze the suitable excel formula to solve the given problems.	**K4**
CO5	Determine the effective data analysis and data validation techniques to obtain thereport with greater accuracy.	**K5**
CO6	Create a data report for various real-time applications	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	M	H	M	H	H	L
CO2	H	H	H	M	L	L	H	H	H
CO3	H	H	H	M	M	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	M	H	M	M	H	H	H
CO6	H	M	M	M	M	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	H	L
CO2	H	M	L
CO3	H	H	H
CO4	H	H	H
CO5	H	H	H
CO6	H	H	H

(For Candidates admitted in the academic year 2021-2022)

Course Title	**NON-MAJORELECTIVE-3-FUNDAMENTALS OF WEB TECHNOLOGIES**
Code	**U21SD5NMT03**
Course type	**Theory**
Semester	**V**
Hours/Week	**3**
Credits	**3**
Marks	**100**

CONSPECTUS

To enable the students to learn the concepts of basic internet, protocols, basic html tags and internet security.

COURSE OBJECTIVES

1. To Understand basic concepts of internet.
2. To Understand the process of TCP/IP.
3. To identify various tags in HTML.
4. To understand basic concepts of DBMS.
5. To awareness of inter net security.

UNIT I **9Hrs**

Internet – Web browsers – Web page –**DND**– E-mail – FTP – TFTP – History of WWW – Basics of WWW and Browsing – Web Browser Architecture–Webpage and Multimedia– Remote Login (TELNET).

Extra Reading/Keywords*:* *multimedia concepts.*

UNIT II **9Hrs**

TCP/IP: TCP/IP Basics – IP address –Logical Address -TCP/IP Example- The conceptofIPaddress– BasicsofTCP–FeaturesofTCP–RelationshipbetweenTCPandIP–Portsand Sockets–Active Open and Passive Open-TCP Connections.

Extra Reading/Keywords*:* *TCP/TP features*.

UNIT III **9Hrs**

HTML: Introduction to elements of HTML-heading and paragraph-various tags-working with text-font-order list- unorder list-images- multimedia-Achar Tag-Hyperlink-HTML tables-forms-frames.

ExtraReading/Keywords: *Advanced HTML tags*.

UNIT IV Introduction to DBMS **9Hrs**

Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables-cloud enabling technology, cloud storage.

ExtraReading/Keywords: *Realtime applications database*.

UNIT V **9Hrs**

E-Security –Security in Cyberspace–Designing for Security–The VIRUS – Security Protection and Recovery – Role of Biometrics – Security and Terrorism- Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.

ExtraReading/Keywords: Realtime applications using e-security**.**

COURSE OUTCOMES

CO. No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Design simple web pages using markup languages like HTML and XHTML.	**K1**
CO-2	Discuss dynamic web pages using DHTML and java script that is easy to navigate and use.	**K2**
CO-3	To build Program server-side web pages that have to process request from client-side web pages.	**K3**
CO-4	Describe the Understand various web services and how these web services interact.	**K4**
CO-5	Explain Represent web data using XML and develop web pages using JSP.	**K5**
CO-6	Develop any web sites using XML and JSP.	**K6**

(K1=Remember, K2=Understand, K3=Apply, K4=Analyze, K5=Evaluate, K6= Create)

TEXT BOOKS

1.C. Xavier, World Wide Web Design with HTML 2017, Tata Mc Graw Hill.
2. Readings in data base system, stone braker Michael heller stein joseph m book 2017
3. Raef Meeuwisse Cyber security For Beginners-2nd edition march 2017

SUGGESTED READINGS

1. A text of computer network s.k. kataria and sons 3th edition in 2017.
2. Alexis Leon & Mathews Leon, "Fundamentals of DBMS", Vijay Nicole Publications 2018, 2nd Edition
3. Jeetendra panda introduction to cyber security2017.
4 Kris Jamsa, **"Cloud Computing"**, Jones and Bartlett Learning,2017
5 Learning Web Design · HTML and CSS QuickStart Guide · BY Robbins, Jennifer Nieders,2018

WEB REFERENCES

1. https://www.javatpoint.com/internet
2. https://www.tutorialspoint.com/tcp-ip-in-computer-networking
3. https://www.w3schools.com/html/
4. https://www.tutorialspoint.com/html/index.htm
5. https://www.esecuritysystem.in/ index.htm

Note: Learners are advised to use latest edition of books.

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	H	L	H	M	H	H	L
CO2	H	M	M	L	M	M	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	M	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	M	H	H
CO6	H	M	H	H	H	H	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO1	H	M	H
CO2	H	M	H
CO3	H	M	H
CO4	H	H	H
CO5	H	M	H
CO6	H	M	H

(For candidates admitted in the academic year 2021-2022)

Course Title	SOFTWARE TESTING
Code	U21SD6MCT16
Course Type	Theory
Semester	VI
Hours/Week	5
Credits	4
Marks	100

CONSPECTUS

To understand the Fundamentals concepts, software testing levels and test management to solve test cases of real-time applications using test tools.

COURSE OBJECTIVES

1. Understand and explore the fundamentals of SDLC
2. Classify and apply various types of testing methods in white box testing and black box testing
3. Understand the various levels of testing and its applications.
4. Explore the test tools, Lab set up and test roles for software component
5. Identify and analyze the steps in involved in test planning, management, process and reporting and to demonstrate and use test tools to solve test cases

UNIT-I: 15Hrs

Software Development Life Cycle Models: Phases of Software Project – Quality, Quality Assurance and Quality control – Testing, Verification & Validation – Process Model – Life Cycle Models - **White Box Testing**: Definition – Static Testing – Structural Testing – Challenges

Extra Reading/Keywords: *V Model*

UNIT-II 15Hrs

Black Box Testing-Integration Testing: Introduction – Integration testing as a Type of Testing – Integration Testing as a Phase of Testing – Scenario testing – Defect Bash -

Extra Reading/Keywords: *Vector Software-Integration testing tool*

UNIT-III 15Hrs

System and Acceptance Testing: Overview of System Testing? – Functional Vs Non-Functional Testing – Functional System Testing – Non-Functional Testing – Acceptance Testing. **Performance Testing:** Factors governing Performance Testing – Methodology for Performance Testing.

Extra Reading/Keywords: *Web Load, Load Ninja, subject7*

UNIT-IV 15Hrs

Regression Testing: – Regression Testing – Types of Regression Testing – Implementation of Regression Testing **Internationalization Testing**: Introduction- Primer on internalization – Test Phases for internalization testing – Enabling Testing – Locale Testing – internalization Validation – Language Testing – Localization Testing – Tools Used for internalization.

Extra Reading/Keywords: *Maze, Look back*

UNIT-V **15Hrs**

Test Planning, Management, Execution and Reporting: - Test Planning -Test Management – Test Process – Test Reporting. **Software Test Automation**: What is Test Automation – Terms used in Automation – Skills Needed for Automation – Automate, Scope of Automation – Design & Architecture for Automation – Generic Requirement for Test Tool Framework?

Extra Reading/Keywords: *Katalon studio, Selenium, Appium*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the fundamental concepts software life cycle model and to understand the importance of testing	K1
CO-2	Identify the types of testing and apply black box and white box testing to the test cases	K2
CO-3	Apply suitable level of testing to test cases of real time problems to detect error	K3
CO-4	Analyze the steps involved in Test Planning, Test management, Test process and Test report for a real-time problem to obtain efficient solution.	K4
CO-5	Implement suitable test tools to solve test cases of real-time applications	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyse; K5- Evaluate)

TEXT BOOK

1. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing – Principle & Practices", Pearson Education, New Delhi, 2017.

SUGGESTED READINGS

1. N. Vadivelan, R. Sabithra, K. Anitha, "Software Testing", Notion Press,2019
2. Jyoti Mante, Ganesh Mante, Asawari Shiposkar, "Software Testing", Nirali Prakashan, 2018.
3. Graham, Black, Veene, "Foundation of Software Testing", Cengage,4th edition,2020.
4. Gurpreet kaur and Archana Yadav, "software Testing Concepts and Technologies", S.K.Kataria and Sons,2nd Edition,2015.
5. S.Ponmalar, Deepa, "Software testing with Selenium automated tools:Selenium for beginners" amazon Asia-Pacific holdings pvt ltd,2020

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Software_testing
2. https://www.javatpoint.com/software-testing-tutorial
3. https://www.guru99.com/software-testing-introduction-importance.html
4. https://www.tutorialspoint.com/software_testing/software_testing_quick_guide.html
5. https://www.tricentis.com/learn/software-testing-tools

CO- PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	H	L	H	M	H	H	L
CO2	H	M	M	L	M	M	H	H	H
CO3	H	H	H	M	H	M	H	H	H
CO4	H	M	H	H	H	H	H	H	H
CO5	H	H	M	L	M	M	M	H	H

PSO – CO MAPPING

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

(For candidates admitted in the academic year 2021-2022)

Course Title	INTERNET OF THINGS
Code	U21SD6MCT17
Course Type	Theory
Semester	VI
Hours/Week	5
Credits	5
Marks	100

CONSPECTUS

To understand the Fundamentals, Architecture and Protocols of Internet of Things and its applications in various domains.

COURSE OBJECTIVES

1. Understand the Internet of computers and Internet of things and to identify various protocols, communication model and technologies used in IoT.
2. Explore applications of IoT in different domains.
3. Understand the difference between IoT and M2M and to examine SDN and NFV architecture
4. Analyse various stages of IoT design methodology.
5. Demonstrate working principles of IoT applications using Arduino boards.

UNIT-I: INTRODUCTION TO IoT **15Hrs**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems Levels and Deployment templates.

Extra Reading/Keywords: ***Bio sensors, Nano sensors***

UNIT-II: DOMAIN SPECIFICS OF IOT **15Hrs**

Introduction-Home Automation-Cities-Environment- Energy- Retail- Logistics- Agriculture-Industry- Health and Life Style-Wearable electronics.

Extra Reading/Keywords: Physical Web, mDNS

UNIT-III: IoT AND M2M **15Hrs**

IoT and M2M – Software defined networks-network function virtualization, difference between SDN and NFV for IoT-Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, and SNMP NETOPEER.

Extra Reading/Keywords: ***5G technology, ambient intelligence***

UNIT-IV: IOT PLATFORM DESIGN METHODOLOGY **15Hrs**

Introduction- IoT Design and Methodology- Purpose and requirements specification- Process specification- Domain model specification, -Information model specification, service specification-IoT level specification- functional view specification, Operational view specification, Device and component integration, application development.

Extra Reading/Keywords: ***Security and Context Aware architecture***

UNIT-V: INTRODUCTION TO ARDUINO **15Hrs**

Introduction –getting Started-Writing programs for Arduino-LED programming-programming with Push Button-Analog inputs and various buses.

Extra Reading/Keywords: ***Simulator-Proteus***

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

The Learners

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the basic operations of Internet of Things, protocols and its architecture.	K1
CO-2	Understand the difference between IoT and M2M communication and various steps involved in IoT design methodology.	K2
CO-3	Implement the IoT design to develop prototype using Arduino board with C-programming.	K3
CO-4	Examine the SDN and NFV architecture and IoT design methodology for different domain specifics of IoT.	K4
CO-5	Determine the suitable architecture and IoT level to provide digital solutions for various real time applications	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyse; K5- Evaluate)

TEXT BOOKS

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.

UNIT I: CHAPTER 1

UNIT II: CHAPTER 2

UNIT III: CHAPTER 3

UNIT IV: CHAPTER 4

2. Ashwin Pajankar, "Arduino Made Simple with Interactive Projects", BPB Publications,2018.

UNIT V: CHAPTER 1,2,3,4,5,6

SUGGESTED READINGS

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", Cisco Systems,2017.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things Enabling Technologies, Platforms and Use Cases", Taylor & Francis, CRC Press, 2017.
4. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
5. OvidiuVermesan, Peter Friess, "Internet of Things-From Research and Innovation to Market deployment", Rivers publisher. Adrian McEWen and Hakim Cassimally, "Designing the Internet of Things", John Wiely and Sons Private Ltd,2014.

WEB REFERENCES

1. https://www.techtarget.com/whatis/feature/IoT-basics-A-guide-for-beginners.
2. https://www.simplilearn.com/iot-applications-article.
3. https://www.interviewbit.com/blog/difference-between-iot-and-m2m/
4. https://www.drpankajdadhich.com/2022/06/lot-design-methodology.html
5. https://www.uio.no/studier/emner/matnat/ifi/IN1060/v21/arduino/arduino-projects-book.pdf

Note: Learners are advised to use latest edition of books.

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	L	M	M	L	M	M	M
CO-2	H	M	M	M	M	L	M	M	M
CO-3	H	H	H	H	H	M	H	H	H
CO-4	H	H	M	M	M	M	H	H	H
CO-5	H	H	H	H	H	M	H	H	H

PSO – CO MAPPING

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

(For candidates admitted in the academic year 2021-2022)

Course Title	SOFTWARE TESTING - LAB
Code	U21SD6MCT17
Course Type	Practical
Semester	VI
Hours/Week	5
Credits	4
Marks	100

CONSPECTUS

Learn the different software testing tools and techniques.

COURSE OBJECTIVES:

1. Apply various testing techniques and to detect the errors in the software.
2. Generate and apply the test cases using the automated testing tool.
3. Learn the functionality of automated testing tools to apply in the specialized Environment
4. Gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
5. Explore the techniques and skills on how to use modern software testing tools to support software testing projects.

EXERCISES:

1. Install Selenium IDE; develop a test suite containing minimum 4 test cases for different formats.
2. Performa test suite for any two websites.
3. Test the values from drop down list using selenium web driver.
4. Test the image upload button using selenium web driver.
5. Test how to download file using selenium web driver.
6. Test whether checkbox and radio buttons are working using selenium web driver.
7. Install Selenium Web Server and demonstrate it using a script in Java.
8. Develop and test a program to login a specific webpage.
9. Develop and test a program to provide total number of objects available on a webpage.
10. Develop and test a program to get the number of list items in a list/combo box.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the testing techniques and to detect the errors in the software.	K1
CO-2	Understand and apply the test cases using the automated testing tool.	K2
CO-3	Construct the functionality of automated testing tools to apply in the specialized Environment	K3
CO-4	Analyze the software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.	K4
CO-5	Determine techniques and skills on how to use modern software testing tools.	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyze; K5- Evaluate)

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	M	M	M	M	H	M	M
CO-2	H	M	M	M	M	L	M	M	M
CO-3	M	M	H	H	H	M	H	H	H
CO-4	M	H	M	M	M	M	H	M	H
CO-5	H	M	M	H	H	M	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	M	L
CO-2	M	M	M
CO-3	H	M	H
CO-4	H	M	H
CO-5	M	H	M

(For candidates admitted in the academic year 2021-2022)

Course Title	INTERNET OF THINGS- LAB
Code	U21SD6MCP19
Course Type	Practical
Semester	VI
Hours/Week	5
Credits	4
Marks	100

CONSPECTUS

To understand and implement the application of IoT using microcontrollers and sensors.

COURSE OBJECTIVES:

1. To understand and explore the types of sensor
2. To identify the pin configuration of board Node MCU, Arduino, Raspberry PI
3. To analyze the working principles of sensors and actuation
4. To examine various protocols and its usage in communication.
5. To develop Program to implement real time IoT applications

EXCERCISES

1. Introduction to various sensors and various actuators & its Application (Students have to prepareReport for the same).
    - PIR Motion Sensor
    - Rain Drop Sensor
    - Moisture Sensor
    - Temperature Sensor
    - Touch Sensor
    - Infrared Sensor
    - Servo Motor
    - RFID Sensor
    - Bluetooth Module
    - Wi-Fi Module
2. Demonstrate Node MCU and its working
3. Getting Started with ESP8266 Wi-Fi SoC
4. Demonstrate Arduino and its pins.
5. Perform Experiment using Arduino Uno to measure the distance of any object using Ultrasonic Sensor.
6. Create a circuit using Arduino and sensors. Perform experiment using Arduino Uno to Learn Working of Servo Motor
7. Creating a webpage and display the values available through Arduino.
8. Demonstration of Setup & Working of Raspberry Pi.
9. OPEN Ended problem: Students are required to submit an IOT based project using the Microcontroller or a Raspberry Pi and connecting various sensors and actuators. The datafor the same should be displayed via a webpage or a web app.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the various types of microcontrollers and sensors	K1
CO-2	Understand the working principles of microcontroller and sensors	K2
CO-3	Construct the IoT device using Arduino board and C programming	K3
CO-4	Analyze the effective way of implementing the concepts with different microcontrollers	K4
CO-5	Determine the IoT level for implementing the real-time project	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyse; K5- Evaluate)

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	L	M	M	L	M	M	M
CO-2	H	M	M	M	M	L	M	M	M
CO-3	H	H	H	H	H	M	H	H	H
CO-4	H	H	M	M	M	M	H	H	H
CO-5	H	H	H	H	H	M	H	H	H

PSO – CO MAPPING

CO/PSO	PSO1	PSO2	PSO3
CO-1	H	L	L
CO-2	H	M	M
CO-3	H	H	H
CO-4	H	H	H
CO-5	H	H	H

(For candidates admitted in the academic year 2021-2022)

Course Title	INFORMATION AND CYBER SECURITY
Code	U21SD6MET04
Course Type	Theory
Semester	VI
Hours/Week	4
Credits	3
Marks	100

CONSPECTUS

To gain in-depth knowledge in the field of Information and Cyber Security.

COURSE OBJECTIVES:

1. Understand the basics of Cyber Security.
2. Identify the domain of cyber security policy.
3. Analyze cyber security frameworks and security policy.
4. Apply security principles and develop control system.
5. Apply cyber security protection methods in real time applications.

UNIT I **12Hrs**

INFORMATION SECURITY OVERVIEW: The Evolution of Information Security-To build a Security Program: Authority-Framework-Assessment-Planning-Action-Maintenance-Business Processes Vs Technical Controls. **RISK ANALYSIS: Threat** Definition: Threat Vectors-Threat Sources and Targets-Types of Attacks: Malicious mobile code-APTs-Manual Attacks-Risk Analysis.

Extra Reading/Keywords: ***Cyber intrusion , Cyberterrorism***

UNIT II **12Hrs**

AUTHENTICATION AND AUTHORIZATION: Authentication: Usernames and Passwords-Certificate –Based Authentication-EAP-Biometrics-Additional uses for Authentication. Authorization: User Rights-Role Based Authorization (RBAC)-Access Control Lists (ACLs)-Rule-Based Authorization. **ENCRYPTION**: Symmetric Key Cryptography-Public Key Cryptography. **DATABASE SECURITY**: Understanding Database Security Layers: Server-Level Security-Network-Level Security-Operating System Security. Understanding Database Level Security: Database Administration Security-Database Roles and Permissions.

Extra Reading/Keywords: ***OpenID Connect protocol, OAuth 2.0 framework***

UNIT III **12Hrs**

INTRUSION DETECTION AND PREVENTION SYSTEMS: IDS Types and Detection Models: Host Based IDS-Network Based IDS(NIDS)-Anomaly-Detection (AD)Model-Signature –Detection Model. IDS Features: IDS End-User Interface -Intrusion-Prevention Systems (IPS). **DISASTER RECOVERY, BUSINESS CONTINUITY, BACKUPS AND HIGH AVAILABILITY:** Disaster Recovery-Business Continuity Planning-Backups.

Extra Reading/Keywords: ***Intrusion detection, Intrusion Detection System***

UNIT IV **12Hrs**

INTRODUCTION TO CYBERCRIME: Definition-Classification of Cybercrimes: E-Mail Spoofing-Spamming- Cyber Defamation-Internet Time Theft-Salami Attack/Salami Techniques-Data Diddling-Web Jacking-Pornographic Offenses-E-Mail Bombing-Password Sniffing-Credit Card Frauds-Identity Theft. **CYBEROFFENSES:** Introduction-Categories of Cybercrime-Criminals Plan the Attacks-Reconnaissance-Passive Attacks-Active Attacks-Scanning and Scrutinizing Gathered Information-Attack. Cyberstalking: Types of Stalkers.

Extra Reading/Keywords: ***Bluejacking, WEP attack***

UNIT V **12Hrs**

CYBERCRIME: MOBILE AND WIRELESS DEVICES: Introduction-Trends in Mobility-Attacks on Mobile Phones-Laptops. **UNDERSTANDING COMPUTER FORENSICS**: The need for Computer Forensics-Digital Forensics Life Cycle-Network Forensics. **CYBERSECURITY: ORGANIZATIONAL IMPLICATIONS**: Introduction-Cost of Cybercrimes and IPR Issues. Security and Privacy Implications**.**

Extra Reading/Keywords: ***Blue snarfing, RF Jamming***

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

The Learners

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the various attacks and cyber-crimes and the importance of cyber security and cyber forensics	K1
CO-2	Understand and identify the various concepts and techniques in cryptography and cybercrime	K2
CO-3	Analyze and categorize the attacks and cybercrimes and to explore the advantages of cyber forensics	K3
CO-4	Demonstrate suitable security mechanisms to avoid attacks and to methods to enhance protection in information security and cyber security	K4
CO-5	Assess the protection methods or techniques that are suitable to solve the security breaches and cyber attacks	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyse; K5- Evaluate)

TEXT BOOKS

1. Mark Rhodes-Ousley "The Complete Reference –Information Security" McGraw Hill Education (India) Private Limited, Edition 2013.

2. Nina Godbole, Sunit Belapure – "Cyber Security" Wiley India Pvt . Ltd, 2021.

SUGGESTED READINGS

1. Michael E Whitman and Herbert J Mattord, ―Principles of Information Security, Vikas Publishing House, New Delhi, 2021,7th edition.
2. Raef Meeuwise, "Cyber Security for beginners", Cyber Simplicity Ltd,2017
3. Micki Krause, Harold F. Tipton, ― Handbook of Information Security Management, Vol 1-3 CRCPress LLC, 2004.
4. Stuart McClure, Joel Scrambray, George Kurtz, ―Hacking Exposed, Tata McGraw- Hill, 2003
5. Matt Bishop, ― Computer Security Art and Science, Pearson/PHI, 2002.

WEB REFERENCES

1. https://www.kaspersky.com/resource-center/definitions/what-is-cyber-security
2. https://www.javatpoint.com/what-is-cyber-security
3. https://www.itgovernance.co.uk/what-is-cybersecurity
4. https://www.bitsight.com/blog/cybersecurity-vs-information-security
5. https://en.wikipedia.org/wiki/Computer_security
6. https://auth0.com/docs/get-started/identity-fundamentals/authentication-and-authorization

Note: Learners are advised to use latest edition of books.

PO – CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	M	M	M	L	M	L	M
CO-2	H	L	M	M	L	L	M	M	M
CO-3	M	H	H	L	H	M	H	H	H
CO-4	H	H	M	M	M	M	H	M	H
CO-5	H	M	H	L	H	M	H	H	H

PSO – CO MAPPING

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

(For the candidates admitted in the academic year 2021-2022)

Course Title	BASICS OF INFORMATION SECURITY
Code	U21SD6NMT04
Course Type	Theory
Semester	VI
Hours/Week	3
Credits	3
Marks	100

CONSPECTUS

To understand the Fundamentals concepts of various security issues in computer system

COURSE OBJECTIVES

1. To prepare students to understand fundamentals of security
2. To understand cryptography and comprehensive study of the principles and practices of computer system security
3. To categorize and explore E-mail security
4. To analyze common security mechanism
5. To explore the ethical issues in cyber and mobile security.

UNIT-I **12Hrs**

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms.

Extra Reading/Keywords: Ethical hacking

UNIT-II **12Hrs**

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

Extra Reading/Keywords: *cryptographic algorithm*

UNIT-III **12Hrs**

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture

Extra Reading/Keywords: Network security

UNIT-IV **12Hrs**

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

Extra Reading/Keywords: *security mechanisms*

UNIT-V **12Hrs**

Cyber Security: Introduction – Cyber security fundamentals – The 7 layers of cyber security –Mobile and Wireless Devices: Attacks on Mobile – Cell Phones – Cyber Crime Prevention Tips.

Extra Reading/Keywords: *Modern ciphers*

Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.

COURSE OUTCOMES

CO No.	Course Outcomes	Cognitive Level (K1-K5)
CO-1	Recognize the importance of computer security in current scenario	K1
CO-2	Understand and identify the various concepts and techniques in cryptography	K2
CO-3	Analyze the different method of E-mail security	K3
CO-4	Demonstrate suitable security control measures and security mechanisms to protect information	K4
CO-5	Analyze the various issues in mobile security and to solve cyber issues.	K5

(K1- Remember; K2- Understand; K3 – Apply; K4 – Analyse; K5- Evaluate)

TEXT BOOKS

1. Cryptography and Network Security: William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2" Edition
3. Nina Godbole, Sunit Belapure, Cyber Security, Cyber Security, Wiley Publications.

SUGGESTED READINGS

1. Sanil Nadkarni, “Fundamentals of Information Security: A complete go to guide for beginners”, BPB publications 2020.
2. Raef Meeuwise, “Cyber Security for beginners”, Cyber Simplicity Ltd,2017
3. Mark Merkow. “Information security-principles and practices, Pearson India,2007
4. Pankaj Sharma, “Information Security”, S. K. Kataria and sons,2013
5. Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley Publications,2011
6. Mark Merkow. “Information security-principles and practices, Pearson India,2007.

WEB REFERENCES

1. What is Information Security? - GeeksforGeeks
2. https://www.cisa.gov/sites/default/files/publications/infosecuritybasics.pdf
3. What is information security? Definition, principles, and jobs | CSO Online
4. What are Information Security Controls? — Risk Optics (reciprocity.com)
5. What is Cyber Security? | Definition, Types, and User Protection (kaspersky.com)

PO–CO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	H	M	H	H	H	L	M	H	H
CO-2	H	M	H	H	H	L	M	H	H
CO-3	H	M	H	H	H	L	M	H	H
CO-4	H	H	H	H	H	L	M	H	M
CO-5	H	H	H	H	H	L	M	H	H

PSO–CO MAPPING

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