Holy Cross College (Autonomous), Nagercoil

Kanyakumari District, Tamil Nadu.
Accredited with A⁺ by NAAC - IV cycle – CGPA 3.35

Affiliated to

Manonmaniam Sundaranar University, Tirunelveli

Semester I & II

Guidelines & Syllabus

DEPARTMENT OF COMPUTER SCIENCE

2023-2026

(With effect from the academic year 2023-2024)

Issued from

THE DEANS' OFFICE

Vision

To provide a high-quality undergraduate education in computer science that prepares students for productive careers and life long learning.

Mission

1. To demonstrate proficiency in problem-solving techniques using the computer.
2. To demonstrate proficiency in at least two high-level programming languages and two operating systems
3. To show the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
4. To show the ability to function effectively on teams to accomplish a common goal.
5. To sensitize the students to the social realities around them with the vision of making them responsible citizen.

Programme Educational Objectives (PEOs)

PEOs	Upon completion of B.A/B.Sc. degree programme, the graduates will be able to	Mission addressed
PEO 1	apply appropriate theory and scientific knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.	M1& M2
PEO 2	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.	M2, M3, M4 & M5
PEO 3	pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.	M3, M4, M5 & M6

Programme Outcomes (POs)

POs	Upon completion of B.Sc. Degree Programme, the graduates will be able to:	Mapping with PEOs
PO1	obtain comprehensive knowledge and skills to pursue higher studies in the relevant field of science.	PEO 1
PO2	create innovative ideas to enhance entrepreneurial skills for economic independence.	PEO2
PO3	reflect upon green initiatives and take responsible steps to build a sustainable environment.	PEO 2
PO4	enhance leadership qualities, team spirit and communication skills to face challenging competitive examinations for a better developmental career.	PEO 1 & PEO 3
PO5	communicate effectively and collaborate successfully with peers to become competent professionals.	PEO 2 & PEO 3

| PO6 | absorb ethical, moral and social values in personal and social life leading to highly cultured and civilized personality | PEO 2 & PEO 3 |
| PO7 | participate in learning activities throughout life , through self-paced and self-directed learning to develop knowledge and skills. | PEO 1 & PEO 3 |

Programme Specific Outcomes (**PSOs**)

PSOs	Upon completion of the B.Sc. Computer Science Programme, the graduates will be able to:	Mapping with POs
PSO – 1	obtain sufficient knowledge and skills enabling them to undertake further studies in Computer Science and its allied areas on multiple disciplines linked with Computer Science.	PO1
PSO – 2	evaluate and apply emerging technologies in computer science to develop innovative solutions for real-world problems	PO2
PSO – 3	develop a range of generic skills helpful in team building, problem solving, technical ability, employment, internships, communication and societal activities.	PO4 & PO7
PSO – 4	communicate effectively, work collaboratively, and demonstrate ethical and professional attitudes in diverse settings.	PO5 & PO6
PSO – 5	sensitize various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment	PO3

Mapping of PO'S and PSO'S

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO 1	M	S	S	S	S
PO 2	S	M	S	S	S
PO 3	M	S	S	S	M
PO 4	S	S	M	S	S
PO 5	S	M	S	M	S
PO 6	M	S	S	M	S
PO 7	S	S	M	S	S

Eligibility Norms for Admission

Those who seek admission to B.Sc. Computer Science must have passed the Higher Secondary Examination (10+2) (Academic / Vocational Stream) conducted by the Government of Tamil Nadu **with Computer Science or Mathematics as one of the subjects** or an examination accepted as equivalent thereto by the syndicate of Manonmaniam Sundaranar University, Tirunelveli, is eligible for admission and the medium of instruction is English.

Duration of the Programme: 3 years
Medium of Instruction: English

Passing Minimum

      A minimum of 40% in the external examination and an aggregate of 40% is required. There is no minimum pass mark for the Continuous Internal Assessment.

Components of the B.Sc. Computer Science Programme

Part III (Core and Elective Courses)

Core Courses	Core – Theory papers	8 x100	800
	Practical (Core applied)	6 x100	600
	Discipline Specific Elective - Theory papers	4 x 100	400
	Project	1 x 100	100
	Total marks		**1900**
Elective Courses	Theory	4x100	400
	Total marks		**400**
Part III - Total marks			**2300**

- **Core Practical Courses carry 100 marks each.**
- **Practical examination will be conducted at the end of each semester.**

Course Structure

Distribution of Hours and Credits

Curricular Courses:

Course	S I	S II	S III	S IV	S V	S VI	Total	
							H	**C**
Part I Language	6 (3)	6 (3)	6 (3)	6 (3)			24	**12**
Part II English	6 (3)	6 (3)	6 (3)	6 (3)			24	**12**
Part III Core Course	5(5)	5(5)	5(5)	5(5)	5(4) + 5(4)	6(5)+6(4)	78	**69**
Core Lab Course	5(5)	5(5)	5(5)	5(5)	5(4)	6(4)		
Project					5(4)			
Elective /Discipline Specific Elective Courses	4 (3)	4 (3)	4 (3)	4 (3)	4 (3)+ 4 (3)	5 (3)+ 5(3)	34	**24**
Part IV								

Course								
Non-major Elective Course	2 (2)	2 (2)	-	-	-	-	4	4
Skill Enhancement Course	-	2 (2)	1 (1) 2 (2)	1 (1) 2 (2)	-		8	8
Foundation Course	2(2)	-	-	-	-	-	2	2
Value Education	-	-	-	-	2 (2)	-	2	2
Summer Internship /Industrial Training					(2)			2
Environmental Studies	-	-	1	1 (2)	-	-	2	2
Extension activity	-	-	-	-	-	(1)	-	1
Professional Competency Skill						2 (2)	2	2
Total	**30(23)**	**30(23)**	**30(22)**	**30 (24)**	**30 (26)**	**30 (22)**	**180**	**140**

Total number of Hours   =   180

Co-curricular Courses

Course	S I	S II	S III	S IV	S V	S VI	Total
LST (Life Skill Training)	-	(1)	-	(1)			2
Skill Development Training (Certificate Course)	(1)						1
Field Project		(1)					1
Specific Value-added Course	(1)		(1)				2
Generic Value-added Course				(1)		(1)	2
MOOC		(1)		(1)		(1)	3
Student Training Activity: Clubs & Committees / NSS				(1)			1
Community Engagement Activity: RUN				(1)			1
Human Rights Education					(1)		1
Gender Equity Studies						(1)	1
Total							**15**

Courses Offered

Semester I

Course	Course Code	Title of the Course	Credits	Hours/Week
Part I	TU231TL1 FU231FL1	Language: Tamil French	3	6
Part II	EU231EL1	English	3	6
Part III	SU231CC1	Core Course I: Python Programming	5	5
	SU231CP1	Core Lab Course I: Python Programming Lab	5	5
	SU231EC1	Elective Course I: Numerical Methods	3	4
Part IV	SU231NM1	Non Major Elective NME I: Office Automation	2	2
	SU231FC1	Foundation Course: Problem Solving Techniques	2	2
		Total	**23**	**30**

Semester II

Course	Course Code	Title of the Course	Credits	Hours/Week
Part I	TU232TL1 FU232FL1	Language: Tamil French	3	6
Part II	EU232EL1	English	3	6
Part III	SU232CC1	Core Course II: Data Structure and Algorithms	5	5
	SU232CP1	Core Lab Course II: Data Structure and Algorithms Lab	5	5
	SU232EC1	Elective Course II: Discrete Mathematics	3	4
Part IV	SU232NM1	Non Major Elective NME II: Introduction to HTML	2	2
	SU232SE1	Skill Enhancement Course SEC - I: Advanced Excel	2	2
		Total	**23**	**30**

Co-curricular Courses

Specific Value added Course

Part	Semester	Code	Title of the Course	Credit
Part V	I & II	UG232LC1	Life Skill Training I: Catechism	1
		UG232LM1	Life Skill Training I: Moral	
	I	UG231C01 –UG231C--	Skill Development Training (SDT) - Certificate Course	1
	II	SU232FP1	Field Project	1
	I & III	SU231V01-SU231V--/ SU233V01 – SU233V--	Specific Value-added Course	1+1
	II, IV& VI	-	MOOC	1+1+1
	III & IV	UG234LC1	Life Skill Training II: Catechism	1
		UG234LM1	Life Skill Training II: Moral	
	IV & VI	UG234V01-UG234V--/ UG236V01-UG236V--	Generic Value-added Course	1 +1
	I - IV	UG234ST1	Student Training Activity – Clubs & Committees / NSS	1
	IV	UG234CE1	Community Engagement Activity - RUN	1
	V	UG235HR1	Human Rights Education	1
	VI	UG236GS1	Gender Equity Studies	1
			Total	**15**

S. No.	Course code	Title of the course	Credit	Total hours
I	SU231V01	Procedural Language	1	30

Examination Pattern
Each paper carries an internal component.
There is a passing minimum for external component.
A minimum of 40% in the external examination and an aggregate of 40% is required.

a. Part I – Tamil, Part II – English, Part III - (Core Course/ Elective Course)
Ratio of Internal and External= 25:75

Continuous Internal Assessment (CIA)

Internal Components and Distribution of Marks

Components	Marks
Internal test (2) (40 marks)	10
Quiz (2) (20 marks)	5
Assignment: (Model Making, Exhibition, Role Play, Seminar, Group Discussion, Problem Solving, Class Test, Open Book Test etc. (Minimum three items per course should be included in the syllabus & teaching plan) (30 marks)	10
Total	**25**

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 4 x 1(No choice)	4	Part A 10 x 1 (No choice)	10
Part B 3 x 4(Internal choice)	12	Part B 5 x 6 (Internal choice)	30
Part C 3 x 8 (Internal choice)	24	Part C 5 x 12(Internal choice)	60
Total	**40**	**Total**	100

Lab Course:

Ratio of Internal and External= 25:75

Total: 100 marks

Internal Components and Distribution of Marks

Internal Components	Marks
Performance of the Experiments	10
Regularity in attending practical and submission of records	5
Record	5
Model exam	5
Total	**25**

Question pattern

External Exam	Marks
Major Practical	
Minor Practical / Spotters /Record	75
Total	**75**

Core Project

Ratio of Internal and External = 25:75

Components	Marks
Internal	25
External	
Report	40
Viva voce	35

Part - IV

i. **Non-major Elective, Foundation Course, Skill Enhancement Course, Value Education, Professional Competency Skill**

Ratio of Internal and External = 2**5: 75**

Internal Components and Distribution of Marks

Components	Marks
Internal test (2)	10
Quiz (2)	5
Assignment: (Model Making, Exhibition, Role Play, Album, Group Activity (Mime, Skit, Song) (Minimum three items per course)	10
Total	**25**

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 2 x 2 (No Choice)	4	Part A 5 x 2 (No Choice)	10
Part B 3 x 4 (Open choice **Three** out of **Five**)	12	Part B 5 x 5 (Open choice any **Five** out **of Eight**)	25
Part C 1 x 9 (Open choice **One** out of **Three**)	9	Part C 5 x 8 (Open choice any **Five** out **of Eight**)	40
Total	**25**	**Total**	**75**

ii.   Environmental Studies
Internal Components

Component	Marks
Project Report	15
Viva voce	10
Total	**25**

Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 2 x 2 (No Choice)	4	Part A 5 x 2 (No Choice)	10
Part B 3 x 4 (Open choice **Three** out of **Five**)	12	Part B 5 x 5 (Open choice any **Five** out **of Eight**)	25
Part C 1 x 9 (Open choice **One** out of **Three**)	9	Part C 5 x 8 (Open choice any **Five** out **of Eight**)	40
Total	**25**	**Total**	**75**

iii. Summer Internship/Industrial Training

Components	Marks
Industry Contribution	50
Report & Viva-voce	50

Co-Curricular Courses:

i. Life Skill Training: Catechism & Moral, Human Rights Education & Gender Equity Studies
Internal Components

Programme	Assessment	Lower Order Thinking		Higher order thinking	Total number of
		Component	Marks		
		Project - Album on current issues	25		
		Group Song/ Mime/ Skit	25		
		Total	**50**		

External Components

Component	Marks
Quiz	20
Written Test: Open choice – 5 out of 7 questions (5 x 6)	30
Total	**50**

ii. Skill Development Training (SDT) - Certificate Course:

Components	Marks
Attendance & Participation	50
Skill Test	50

iii. Field Project:

Components	Marks
Field Work	50
Report & Viva-voce	50

iv. Specific Value-Added Courses & Generic Value-Added Courses:

Components	Marks
Internal	25
External	75

v. Community Engagement Activity: Reaching the Unreached Neighbourhood (RUN)

Components	Marks
Attendance & Participation	50
Field Project	50

vi. Student Training Activity: Clubs and Committees
Compulsory for all I & II year students (1 credit).

Component	Marks
Attendance	25
Participation	25
Total	**50**

Outcome Based Education (OBE)
(i) Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

		K1			K2			K3			K4, K5, K6			
	Part	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	
I UG	Internal	2	2		1	1	1	1	-	2	-	-	-	10
	External	5	2	1	3	2	2	2	1	2	-	-	-	20
II UG	Internal	1	-	1	1	2		1	-	1	1	1	1	10
	External	5	1	1	4	1	1	-	3	1	1	-	2	20
III UG	Internal	1	1	-	-	1	-	1	-	1	2	1	2	10

(ii) Weightage of K – Levels in Question Paper
Number of questions for each cognitive level:

S. No	Level	Parameter	Description
1	KI	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

Evaluation

i. The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

ii. Evaluation of each course shall be done by Continuous Internal Assessment (CIA) by the course teacher as well as by an end semester examination and will be consolidated at the end of the semester.

iii. There shall be examinations at the end of each semester, for odd semesters in October/November; for even semesters in April/ May.

iv. A candidate who does not pass the examination in any course(s) shall be permitted to reappear in such failed course(s) in the subsequent examinations to be held in October/ November or April/May. However, candidates who have arrears in practical examination shall be permitted to reappear for their areas only along with regular practical examinations in the respective semester.

v. Viva-voce: Each project group shall be required to appear for Viva -voce examination in defence of the project.

vi. The results of all the examinations will be published in the college website.

Conferment of Bachelor's Degree

A candidate shall be eligible for the conferment of the Degree of Bachelor of Arts / Science / Commerce only if the minimum required credits for the programme thereof (140 + 18 credits) is earned.

Grading System

For the Semester Examination:

Calculation of Grade Point Average for End Semester Examination:

GPA = <u>Sum of the multiplication of grade points by the credits of the course</u>
Sum of the credits of the courses (passed) in a semester

For the entire programme:

Cumulative Grade Point Average (CGPA) $\Sigma_n\Sigma_i C_{ni}G_{ni} / \Sigma_{ni}\Sigma_i C_{ni}$

CGPA = <u>Sum of the multiplication of grade points by the credits of the entire programme</u>
Sum of the credits of the courses of the entire programme

Where

C_i — Credits earned for course i in any semester

G_i — Grade point obtained for course i in any semester

n — semester in which such courses were credited

Final Result

Conversion of Marks to Grade Points and Letter Grade

Range of Marks	Grade Points	Letter Grade	Description
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

Overall Performance

CGPA	Grade	Classification of Final Result
9.5-10.0	O+	First Class – Exemplary*
9.0 and above but below 9.5	O	First Class – Exemplary*
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	First Class with Distinction*
7.5 and above but below 8.0	D	First Class with Distinction*

7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.0 and above but below 5.0	C	Third Class
0.0 and above but below 4.0	U	Re-appear

*The candidates who have passed in the first appearance and within the prescribed semester are eligible for the same.

Core Course I: Python Programming

Course Code	L	T	P	S	Credits	Inst. Hours	Total	Marks		
								CIA	External	Total
SU231CC1	4	1	-	-	5	5	75	25	75	100

Prerequisite:

Basic Knowledge of Programming concept.

Learning Objectives:

1. To understand the syntax and semantics of Python programming language.
2. To know the usage of packages and Dictionaries

Course Outcomes

On the successful completion of the course, student will be able to:	
1.	remember fundamental python syntax and basic data types, and understand the concepts.	K1 & K2
2.	understand the functionality and purpose of control structures and apply the concepts to identify patterns and relationships.	K2 & K3
3.	understand the purpose of functions, database and apply this to solve problems.	K2 & K3

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	**Basics of Python Programming:** History of Python – Features of Python – Literal – Constants – Variables – Identifiers – Keywords - Built-in Data Types – Output Statements – Input Statements - Comments – Indentation - Operators-Expressions - Type Conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.	15
II	**Control Statements:** Selection/Conditional Branching Statements: if, if-else, nested if and if-elif-else Statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass Statements.	15
III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime - Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments - Recursion. **Python Strings:** String Operations - Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: Import Statement - The Python	15

	Module – dir() Function – Modules and Namespace – Defining our own Modules.	
IV	**Lists:** Creating a list - Access values in List - Updating values in Lists - Nested Lists - Basic List Operations - List Methods. **Tuples:** Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between Lists and Tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	15
Self Study	Operators	
V	**Python File Handling:** Types of files in Python - Opening and Closing Files - Reading and Writing Files: write() and writelines() Methods - append() Method – read() and readlines() Methods – with keyword – Splitting words – File methods - File Positions - Renaming and Deleting Files.	15

Text Books
1. ReemaThareja, (2017). *Python Programming using problem solving approach*. (1st edition). Oxford University Press.
2. Dr. R. NageswaraRao, (2017). *Core Python Programming*. (1st edition). Dream tech Publishers.

Reference Books
1. VamsiKurama, *Python Programming: A Modern Approach*, Pearson Education.
2. Mark Lutz, *Learning Python*, Orielly.
3. Adam Stewarts, *Python Programming*, Online.
4. Fabio Nelli, *Python Data Analytics*, APress.
5. Kenneth A. Lambert, *Fundamentals of Python – First Programs*, CENGAGE Publication.

Web Resources
1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html
3. https://www.w3schools.com/python/python_intro.asp
4. https://www.geeksforgeeks.org/python-programming-language/
5. https://en.wikipedia.org/wiki/Python_(programming_language)

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	2	2	3	2	2	2	2

CO2	3	3	2	3	2	2	3	3	3	3	2	2
CO3	3	3	2	3	2	2	2	3	3	3	2	2
TOTAL	9	8	6	7	6	6	7	9	8	8	6	6
AVERAGE	3	2.7	2	2.3	2	2	2.3	3	2.7	2.7	2	2

3 – Strong, 2- Medium, 1- Low
SEMESTER I
Core Lab Course I: Python Programming Lab

Course Code	L	T	P	S	Credits	Inst. Hours	Total	Marks		
								CIA	External	Total
SU231CP1	-	1	4	-	5	5	75	25	75	100

Prerequisite:
    Basic Knowledge of Programming skill.
Learning Objectives:
1. To acquire programming skills in core Python.
2. To develop the ability to write database applications in Python.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	remember fundamental python syntax and basic data types , and understand the concepts.	**K1&K2**
2.	understand the functionality and purpose of control structures and apply the concepts to identify patterns and relationships.	**K2&K3**
3.	understand the purpose of functions , database and apply this to solve problems.	**K2&K3**

K1 - Remember; **K2** - Understand; **K3** – Apply

List of Exercises	No. of Hours

Implement the following exercises using Python Programming language:
  1. Program using variables, constants, I/O statements in Python.
  2. Program using Operators in Python.
  3. Program using Conditional Statements.
  4. Program using Loops.
  5. Program using Jump Statements.
  6. Program using Functions.
  7. Program using Recursion.
  8. Program using Arrays.
  9. Program using Strings.
  10. Program using Modules.
  11. Program using Lists.
  12. Program using Tuples.
  13. Program using Dictionaries.
  14. Program for File Handling.
	75

Text Books
1. ReemaThareja, (2017). *Python Programming using problem solving approach*. (1st edition). Oxford University Press.
2. Dr. R. NageswaraRao, (2017). *Core Python Programming*. (1st edition). Dream tech Publishers.

Reference Books
1. VamsiKurama, *Python Programming: A Modern Approach*, Pearson Education.
2. Mark Lutz, *Learning Python*, Orielly.
3. Adam Stewarts, *Python Programming*, Online.
4. Fabio Nelli, *Python Data Analytics*, APress.
5. Kenneth A. Lambert, *Fundamentals of Python – First Programs*, CENGAGE Publication.

Web Resources
1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html
3. https://www.w3schools.com/python/python_intro.asp

**MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	2	2	3	2	2	2	2
CO2	3	3	2	3	2	2	3	3	3	3	2	2
CO3	3	3	2	3	2	2	2	3	3	3	2	2
TOTAL	9	8	6	7	6	6	7	9	8	8	6	6
AVERAGE	3	2.7	2	2.3	2	2	2.3	3	2.7	2.7	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER I
Elective Course I: Numerical Methods

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
SU231EC1	3	1	--	-	3	4	60	25	75	100

Pre-requisite:
Students should know the basic knowledge of programming concept.
Learning Objectives:
1. To realize the basic understanding of numerical algorithms.
2. To implement algorithms to solve mathematical problems on the computer.

Course Outcomes

On the successful completion of the course, student will be able to:	
1.	remember the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for computer problems.	**K1 & K2**
2.	understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	**K2 & K4**
3.	apply this to solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with software applications.	**K3 & K5**
4.	analyze direct methods for solving linear systems.	**K4 & K5**
5.	evaluate methods for solving first and second order ordinary differential equations.	**K3 & K5**

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

Units	Contents	No. of Hours
I	**Fundamentals of Algebraic Equation**: Solution of Algebraic and Transcendental Equations - Bisection Method – Fixed Point Iteration Method – Newton Raphson Method – Linear System of Equations – Gauss Elimination Method. **Chapter 1:** 1.0, 1.3,1.4, 1.6, 2.3	12
II	**Iterative, Interpolation and Approximation:** Iterative Methods - Gauss Jacobi and Gauss Seidel – Interpolation with Unequal Intervals – Lagrange's Interpolation – Newton's Divided Difference Interpolation. **Chapter 2:** 2.5 - 2.7, 4.3 - 4.5	12
III	**Interpolation with Equal Interval:** Difference Operators and Relations. - Interpolation with equal Intervals – Newton's Forward and Backward Difference Formulae. **Chapter 4:** 4.6 **Chapter 5:** 5.1 – 5.2	12
IV	**Numerical Differentiation And Integration:** Approximation of Derivatives using Interpolation Polynomials – Numerical Integration	12

	using Trapezoidal, Simpson's 1/3 Rule, Simpson's 1/3 Rule. **Chapter 5:** 5.3 **Chapter 6:** 6.3 - 6.4	
V	**Initial Value Problems for Ordinary Differential Equations:** Single Step Methods – Taylor's Series Method – Euler's Method – Modified Euler's Method - Runge Kutta Method for solving (first, second, Third) Order Equations. **Chapter 7:** 7.1 -7.4	**12**

Self study	Gauss elimination method Newton's divided difference interpolation Trapezoidal, Simpson's 1/3 rule Runge Kutta method

Text Book

1.Arumugam, S., Thangapandi Isaac, S., Soma Sundaram, A. (2013). *Numerical Analysis with Programming in C*. (4th edition). Bombay: New Gamma Publishing House.

Reference Books

1. Arumugam, S., Thangapandi Isaac, S., Soma Sundaram, A. (2012). *Numerical Methods* (2nd edition). Scitech Publications(India) Pvt Ltd
2. Sastry, S.S. (2003). *Introduction Methods of Numerical Analysis*. (3rd edition). India: Prentice Hall Publication.
3. Gupta, P.P., Malik, G.S., Sanjay Gupta, (1992). *Calculus of Finite Differences and Numerical Analysis*. (16th edition). Bombay: Krishna Prakashan Mandir.

Web Resources

1. https://gdcboysang.ac.in
2. https://www.math.hkust.edu.hk/~machas/numerical-methods.pdf
3. https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf
4. https://www.math.science.cmu.ac.th/docs/qNA2556/ref_na/Katkinson.pdf

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2	2	2	3	2	3	2	2
CO2	3	3	2	2	3	2	3	3	2	3	2	2
CO3	3	3	2	3	3	2	2	3	3	3	2	2
CO4	3	2	2	3	2	3	2	3	2	2	2	2
CO5	3	2	2	3	3	2	2	3	2	2	2	2
TOTAL	15	12	10	14	13	11	11	15	11	13	10	10
AVERAGE	3	2.4	2	2.8	2.6	2.2	2.2	3	2.2	2.6	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER I
Non Major Elective NME I: Office Automation

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU231NM1	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
> Basic skills in Computer operations.

Learning Objectives:
1. To impart training for students in Microsoft Office which has different components like MS Word, MS Excel, MS Access and Power point.
2. To acquire knowledge on editor, spread sheet and presentation software.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	remember the fundamentals and understand the concepts.	**K1&K2**
2.	understand the functionality and purpose of commands and apply the concepts.	**K2&K3**
3.	understand the purpose of functions , database and apply this to solve problems.	**K2&K3**

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	**Introductory concepts:** Memory Unit - CPU - Input Devices: Keyboard, Mouse and Scanner. Output Devices: Monitor, Printer. Introduction to Operating Systems & its Features: DOS – UNIX – Windows. Introduction to Programming Languages.	6
II	**Word Processing:** Open, Save and Close Word Document; Editing Text – Tools, Formatting, Bullets; Spell Checker - Document Formatting – Paragraph Alignment, Indentation, Headers and Footers, Numbering; Printing – Preview, Options, Merge.	6
III	**Spreadsheets:** Excel – Opening, Entering Text and Data, Formatting, Navigating; Formulas – Entering, Handling and Copying; Charts – Creating, Formatting and Printing, Analysis Tables, Preparation of Financial Statements, Introduction to Data Analytics.	6
IV	**Database Concepts:** The Concept of Database Management System; Data Field, Records, and Files, Sorting and Indexing Data; Searching Records. Designing Queries, and Reports; Linking of Data Files; Understanding Programming Environment in DBMS; Developing Menu Drive Applications in Query Language (MS – Access).	6
V	**Power point:** Introduction to Power Point - Features – Understanding Slide Typecasting & Viewing Slides – Creating Slide Shows. Applying Special Object – Including Objects & Pictures – Slide Transition – Animation Effects, Audio Inclusion, Timers.	6

Self study	Keyboard, Monitor

Text Book

    1.Peter Norton, (2015). *Introduction to Computers.* Tata McGraw-Hill.

Reference Book

    1..Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons. (2003). *Microsoft 2003.*
    Tata McGraw-Hill.

Web Resources

    1.   Web content from NDL / SWAYAM or open source web resources
    2.   https://collegedunia.com/courses/diploma-in-office-automation
    3.   https://nielit.gov.in/sites/default/files/Ranchi/160512_OfficeAutomation.pdf

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	2	2	3	2	2	2	2
CO2	3	3	2	3	2	2	3	3	3	3	2	2
CO3	3	3	2	3	2	2	2	3	3	3	2	2
TOTAL	9	8	6	7	6	6	7	9	8	8	6	6
AVERAGE	3	2.7	2	2.3	2	2	2.3	3	2.7	2.7	2	2

3 – Strong, 2- Medium, 1- Low

Foundation Course: Problem Solving Techniques

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU231FC1	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
Students should know the basic of Problem-solving skills.

Learning Objectives:
1. To understand the importance of algorithms and programs, and to know of the basic problem solving strategies.
2. To learn efficient strategies and algorithms to solve standard problems, thus laying a firm foundation for designing algorithmic solutions to problems.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	know the approach and algorithms to solve specific fundamental problems.	**K1**
2	understand the systematic approach to problem solving.	**K2**
3	apply the efficient methods to solve specific problems related to text processing	**K3**

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
I	**Introduction:** History, Characteristics and Limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary Storage Devices, Input Devices and Output Devices. Types of Computers: PC, Workstation, Minicomputer, Main Frame and Supercomputer. Software: System Software and Application Software. **Programming Languages:** Machine Language, Assembly Language, High-level Language, 4GL and 5GL - Features of Good Programming Language. Translators: Interpreters and Compilers.	6
II	**Data:** Data Types, Input, Processing of Data, Arithmetic Operators, Hierarchy of Operations and Output. Different Phases in Program Development Cycle (PDC). **Structured Programming: Algorithm:** Features of Good Algorithm, Benefits and Drawbacks of Algorithm. **Flowcharts:** Advantages and Limitations of Flowcharts, When to use Flowcharts, Flowchart Symbols and Types of Flowcharts. **Pseudocode:** Writing a Pseudocode. Coding, Documenting and Testing a Program: Comment Lines and Types of Errors. **Program design:** Modular Programming.	6
III	**Selection Structures:** Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures:** Counter Controlled Loops – Nested Loops – Applications of Repetition Structures.	6
IV	**Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays	6

	of Characters.	
V	**Data Flow Diagrams:** Definition, DFD Symbols and Types of DFDs. **Program Modules:** Subprograms - Value and Reference Parameters - Scope of a Variable - Functions – Recursion. **Files:** File Basics - Creating and Reading a Sequential File - Modifying Sequential Files.	**6**

Self study	DFD symbols and types of DFDs

Text book

1.Stewart Venit, (2010). *Introduction to Programming: Concepts and Design*. (4th edition). Dream Tech Publishers.

Reference Books

1. Greg W. Scragg, *Problem Solving with Computers*, Jones & Bartlett 1st edition, 1996.
2. George Polya, Jeremy Kilpatrick, *The Stanford Mathematics Problem Book: With Hints and Solutions*, Dover Publications, 2009 (Kindle Edition 2013).

Web Resources

1. https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm
2. http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
3. http://utubersity.com/?page_id=876
4. https://www.creative-biolabs.com/drug-discovery/diagnostics/array-technique.Htm #:~:text=Among%20all%20kinds%20of%20in,most%20important%20detection%20t echnology%20modules.
5. https://www.geeksforgeeks.org/algorithms-gq/pattern-searching/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	2	2	2	2	3	3	3	2	3	2
CO2	3	2	3	3	2	2	3	3	2	2	2	2
CO3	3	3	2	3	2	3	2	2	3	2	2	3
TOTAL	9	8	7	8	6	7	8	8	8	6	7	7
AVERAGE	3	2.6	2.3	2.6	2	2.3	2.6	2.6	2.6	2	2.3	2.3

3 – Strong, 2- Medium, 1- Low

SPECIFIC VALUE ADDED COURSE I: PROCEDURAL LANGUAGE

Course Code	Credit	Total Hours	Total Marks
SU231V01	**1**	**30**	**100**

Prerequisite:

Basic knowledge of programming concept.

Learning Objectives:

1. To familiarize the students with basic concepts of computer programming and developer tools.
2. To develop the skill of programming by learning the basic structure and methods.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	remember the basic fundamentals of C and understand the concepts.	**K1 & K2**
2.	understand the functionality and purpose of control structures and apply the concepts in programming.	**K2 & K3**
3.	understand the various programming constructs and implement it to perform specific task.	**K2 & K3**

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	**Introduction to Computing:** Introduction – Components of a Computer – Concept of Hardware and Software – Art of Programming through Algorithms and Flowcharts. **Overview of C:** History of C – Importance of C – Sample Programs 1, 2, 3, 4, 5 – Basic Structure – Programming Style – Executing a C Program.	**6**
II	**Control Statements:** Conditional execution – Iterations – Multiple Selection. Expressing Computations. **Basic Values and Data:** The abstract state machine – Basic types – Specifying values – Implicit conversions – Binary representations.	**6**
III	**Derived Data Types:** Arrays – Structures. **Functions:** Simple functions – main is special – Recursion. **C Library Functions:**	**6**

	General properties of the C library and its functions – String processing and conversion – Runtime environment settings – Program termination and assertions.	
IV	**Pointers:** Pointer operations – Pointers and Structures – Pointers and arrays – Function pointers. **Function – Like Macros:** Working of function-like macros – Argument checking – Accessing the calling context – Default arguments.	**6**
V	**Files:** Introduction - Defining and opening a file – Closing a file – Input/Output operations on files – Error handling during I/O operations – Random access to files.	**6**

Text Book

1. Jens Gustedt (2019), *Modern C*. (2nd Edition). Publisher(s): Manning Publications. ISBN: 9781617295812.

2. Balagurusamy, E. (2019). Programming in ANSI C. (8th edition). New Delhi: Tata Mc Graw Hill Education Private Limited.

Reference Books

1. King, K.N. (2008). *C Programming: A Modern Approach.* (2nd edition). New York: W.W. Norton & Company.

2. Stephen Prata, (2004). *C Primer Plus.* (5th edition). New York: Addison-Wesley Publication.

3. Paul Deitel, & Harvey Deitel, (2009). *How to Program C.* (6th edition). New Delhi: PHI Learning Private Limited.

SEMESTER II

Core Course II: Data Structure and Algorithms

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU232CC1	4	1	-	-	5	5	75	25	75	100

Pre-requisite:

Students should know the basic knowledge in data and representations.

Learning Objectives:

1. To impart the basic concepts of data structure and algorithms.

2. To acquaint the student with the basics of the various data structures and make the students knowledgeable in the area of data structures.

Course Outcomes

On the successful completion of the course, student will be able to:	
1.	recall the basic data structures like arrays, linked lists, stacks, queues, trees and graphs.	**K1**
2.	understand and apply basic sorting and searching algorithms.	**K2 & K3**
3.	apply data structures and algorithms to solve real-world problems in different domains like databases, and networking.	**K3**

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
I	Abstract Data Types (ADTs) - List ADT - Array-based Implementation - Linked List Implementation Singly Linked Lists - Circular Linked Lists - Doubly-linked Lists – Applications of Lists - Polynomial Manipulation - All Operations – Insertion – Deletion – Merge – Traversal.	15
II	Stack ADT–Operations – Applications - Evaluating Arithmetic Expressions - Conversion of Infix to Postfix Expression - Queue ADT-Operations - Circular Queue - Priority Queue - deQueue Applications of Queues.	15

III	Tree ADT - Tree Traversals - Binary Tree ADT - Expression Trees - Applications of Trees - Binary Search Tree ADT - Threaded Binary Trees - AVL Trees - B-Tree - B+ Tree – Heap - Applications of Heap.	15
IV	Definition - Representation of Graph - Types of Graph - Breadth First Traversal – Depth First Traversal - Topological Sort - Bi-connectivity – Cut Vertex - Euler Circuits - Applications of Graphs.	15
V	Searching - Linear Search - Binary Search – Sorting - Bubble Sort - Selection Sort - Insertion Sort - Shell Sort - Radix Sort – Hashing - Hash Functions - Separate Chaining - Open Addressing - Rehashing Extendible Hashing.	15

Self study	Unit II: Circular Queue

Text books

1. Mark Allen Weiss, 2014. *Data Structures and Algorithm Analysis in C++,* (4th Edition). Pearson Education.

2. ReemaThareja, 2014. *Data Structures Using C*, (2nd Edition), Oxford Universities Press.

Reference Books

1. Sharma A. K, 2011. *Data Structures using C, (3rd Edition),* Pearson Education India.

2. Mark Allen Weiss, 2018. *Data Structures and Algorithms Analysis in Java, (3rd Edition)*, Pearson, Boston, USA.

3. Brassard G. and Bratley P, 2014. *Fundamentals of Algorithms,* (3rd Edition), PHI, New Delhi.

4. Thomas H. Cormen, Chales E. Leiserson, Ronald L. Rivest, Clifford Stein, 2009. *Introduction to Algorithms,* (3rd Edition). McGraw Hill.

5. Aho, Hopcroft and Ullman, 2003. *Data Structures and Algorithms*, (2nd Edition), Pearson Education.

Web Resources

1. https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470029757.app1
2. https://www.javatpoint.com/travelling-sales-person-problem
3. https://www.programiz.com/dsa
4. https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/
5. https://www.gatevidyalay.com/fractional-knapsack-problem-using-greedy-approach/

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2	2	3	3	3	2	3	2
CO2	3	2	3	3	2	2	3	3	2	2	2	2
CO3	3	3	2	3	2	3	2	2	3	2	2	3
TOTAL	9	8	7	8	6	7	8	8	8	6	7	7
AVERAGE	3	2.6	2.3	2.6	2	2.3	2.6	2.6	2.6	2	2.3	2.3

3 – Strong, 2- Medium, 1- Low

Core Lab Course II: Data Structure and Algorithms Lab

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU232CP1	-	-	**5**	-	**5**	**5**	**75**	**25**	**75**	**100**

Pre-requisite:

Students should know the basic skills in problem solving.

Learning Objectives:

1. To understand and implement basic data structures.

2. To apply linear and non-linear data structures in problem solving.

Course Outcomes

On the successful completion of the course, student will be able to**:**	
1.	remember and implement basic data structures linked lists, stacks, queues, trees, graphs.	**K1 & K3**
2.	understand and implement sorting algorithms like bubble, merge, quick sort	**K2 & K3**
3.	applying hash tables and resolving collisions.	**K3**

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours

	1. Write a program to implement the List ADT using arrays and linked lists.
	2. Write a programs to implement the following using a singly linked list.
	    Stack ADT
	    Queue ADT
	3. Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).
	4. Write a program to implement priority queue ADT.	

	5. Write a program to perform the following operations:
	
	    Insert an element into a binary search tree.
	
	    Delete an element from a binary search tree.
	
	    Search for a key element in a binary search tree.
	
	6. Write a program to perform the following operations
	
	    Insertion into an AVL-tree
	
	    Deletion from an AVL-tree
	
	7. Write a programs for the implementation of BFS and DFS for a given graph.
	
	8. Write a program for implementing the following searching methods:
	
	    Linear search
	
	    Binary search.
	
	9. Write a program for implementing the following sorting methods:
	
	    Bubble sort
	
	    Selection sort
	
	    Insertion sort
	
	    Radix sort
		75

Text books

1. Mark Allen Weiss, 2014. *Data Structures and Algorithm Analysis in C++,* (4th Edition), Pearson Education.

2. Reema Thareja, 2014. *Data Structures Using C*, (2nd Edition), Oxford Universities Press.

Reference Books

1. Sharma A. K, 2011. *Data Structures using C, (3rd Edition),* Pearson Education India.

2. Mark Allen Weiss, 2018. *Data Structures and Algorithms Analysis in Java, (3rd Edition),* Pearson, Boston, USA.

3. Brassard G. and Bratley P, 2014. *Fundamentals of Algorithms,* (3rd Edition), PHI, New Delhi.

4. Thomas H. Cormen, Chales E. Leiserson, Ronald L. Rivest, Clifford Stein, 2009. *Introduction to Algorithms,* (3rd Edition). McGraw Hill.

5. Aho, Hopcroft and Ullman, 2003. *Data Structures and Algorithms*, (2nd Edition), Pearson Education.

Web Resources

1. https://onlinelibrary.wiley.com/doi/pdf/10.1002/0470029757.app1
2. https://www.javatpoint.com/travelling-sales-person-problem
3. https://www.programiz.com/dsa
4. https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/
5. https://www.gatevidyalay.com/fractional-knapsack-problem-using-greedy-approach/

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2	2	3	3	3	2	3	2
CO2	3	2	3	3	2	2	3	3	2	2	2	2
CO3	3	3	2	3	2	3	2	2	3	2	2	3
TOTAL	9	8	7	8	6	7	8	8	8	6	7	7
AVERAGE	3	2.6	2.3	2.6	2	2.3	2.6	2.6	2.6	2	2.3	2.3

3 – Strong, 2- Medium, 1- Low

SEMESTER II

Elective Course II: Discrete Mathematics

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU232EC1	3	1	-	-	3	4	60	25	75	100

Pre-requisite:

Basic Concepts in Algebra and Set Theory

Learning Objectives:

1. To learn the concepts of Logic, Functions, Permutations, Combinations and Graph models

2. To motivate the students to solve practical problems using Discrete Mathematics.

Course Outcomes

On the successful completion of the course, student will be able to:	
1.	remember the basic concepts of permutations, combinations, relations and graphs	**K1 & K2**
2.	understand the basic concepts of functions and relations.	**K2**
3.	apply basic counting techniques to solve combinatorial problems.	**K3 & K5**
4.	represent discrete objects and relationships using abstract mathematical structures	**K4 & K5**
5.	apply graphs in a wide variety of models	**K3 & K5**

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

Units	Contents	No. of Hours

I	**Logic:** Propositional logic – Propositions - Conditional Statements – Truth Tables of Compound Propositions - Logical Equivalence - Constructing New Logical Equivalences. **Chapter 1:** Section 1.1 (Pages 1-10 & 16-21) Section 1.2 (Pages 21-29)	**12**
II	**Functions:** One-to-one and onto Functions - Inverse Functions and Composition of Functions - The Graphs of Functions - Some Important Functions. **Chapter 2:** Section 2.3 (Pages 142-157)	**12**
III	**Counting**: The basics of Counting - Basic Counting Principles - Permutations and Combinations. **Chapter 5:** Section 5.1 (Pages 335-340 & 344-347) Section 5.3 (Pages 354-362)	**12**
IV	**Relations**: Relations and their Properties – Functions as Relations - Relation on a Set - Properties of Relation - Combining Relations. **Chapter 7:** Section 7.1 (Pages 459-469)	**12**
V	**Graphs**: Graph - Undirected Graph - Directed Graph – Multigraph - Pseudo Graph - Simple Graph - General Graph - Degree of Vertex – Theorems - Finite Graph - Order of a Graph - Size of a Graph - Null Graph - Isolated Graph - Isomorphic Graphs. Chapter 11: Section 11.1,11.2	**12**

Text books

1. K
e
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Self study	Unit 1: Truth Table
	Unit 2: Functions

eth H. Rosen, 2012. *Discrete Mathematics and Its Applications*, (7th Edition), McGraw Hill.

2. Geetha P, 2023. *Discrete Mathematics*, (2nd Edition), SciTech Publications (India) PVT . LTD.

Reference Books

1. C L Liu, 2018. *Elements of Discrete Mathematics,* (2nd Edition), McGraw Hill.
2. Norman L Biggs, 2011. *Discrete Mathematics,* (1st Edition), Pearson, USA.

2. Kenneth Bogart and Robert L Drysdale, 2014. *Discrete Mathematics for Computer Science,* (3rd Edition), Addison-Wesley.

3. Kenneth H. Rosen, 2011. *Discrete Mathematics and its Applications*, (7th Edition), McGraw-Hill.

4. Gupta P.P, Malik G.S, Sanjay Gupta, 1992. *Calculus of Finite Differences and Numerical Analysis*, (16th Edition), Bombay: Krishna Prakashan Mandir.

5. Kenneth H. Rosen, 2022. *Discrete Mathematics and its Applications*, (8th Edition), McGraw-Hill.

Web Resources

1. **https://www.slideshare.net/asadfaraz4/intro-to-discrete-mathematics**
2. **https://slideplayer.com/slide/13589862/**
3. https://onlinecourses.nptel.ac.in/noc23_cs109/preview
4. **https://www.youtube.com/watch?v=amaH38_mXK4**
5. **https://www.brilliant.org**

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	2	2	3	2	2	2	2
CO2	3	2	2	2	2	2	2	3	2	2	2	2
CO3	2	3	2	2	2	2	2	3	3	2	2	2
CO4	2	2	2	2	3	2	2	3	2	2	2	3
CO5	3	2	2	2	2	2	2	3	2	2	3	2
TOTAL	13	11	10	10	11	10	10	15	11	10	11	11
AVERAGE	2.6	2.2	2	2	2.2	2	2	3	2.2	2	2.2	2.2

3 – Strong, 2- Medium, 1- Low

SEMESTER II

Non Major Elective NME II: Introduction to HTML

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU232NM1	1	1	-	-	2	2	30	25	75	100

Prerequisite:

Basic knowledge in creating websites.

Learning Objectives:

1. To create a web page, insert a graphic, link, table within a web page.
2. To insert ordered and unordered lists within a web page.

Course Outcomes

On the successful completion of the course, student will be able to:	
1.	recall and recognize HTML tags and their syntax.	**K1& K2**
2.	understand the use of HTML elements like headings, paragraphs, lists and links.	**K2**
3.	apply the concepts in creating web pages and formatting it.	**K3**

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	**Introduction: Web Basics:** Define Internet – Web Browsers – Define Webpage – **HTML Basics:** Understanding Tags.	**6**
II	Tags for Document Structure (HTML, Head, BodyTag). **Block Level Text Elements:** Headings Paragraph (<p> tag) – Font Style Elements: (bold, italic, font, small, strong, strike, big tags).	**6**
III	**Lists: Types of Lists:** Ordered, Unordered – Nesting Lists – **Other Tags:** Marquee, HR, BR – Using Images – Creating Hyperlinks.	**6**
IV	**Tables:** Creating Basic Table, Table Elements, Caption – Table and	**6**

	Cell Alignment – Rowspan, Colspan – Cellpadding.	
V	**Frames:** Frameset – Targeted Links – Noframe – Forms: Input, Textarea, Select, Option.	**6**

Text Books

1. Smashing Magazine, 2014. *Mastering HTML5 and CSS3 Made Easy*, Teach U Comp

Self Study	Unit I: HTML Basics
	Unit IV: Tables

Inc.

2. Thomas Michaud, 2013. *Foundations of Web Design: Introduction to HTML & CSS*, Pearson Education.

Reference Books

1. Jon Duckett, 2010. *Beginning HTML, XHTML, CSS and Java Script*, (2nd Edition), Wiley Publishing.

2. Jennifer Niederst Robbins, 2013. *HTML5 Pocket Reference*, (5th Edition), O'Reilly Media.

3. Jennifer Niederst Robbins, 2018. *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, (5th E*dition), O'Reilly Media.

4. Mark Pilgrim, 2010. *HTML5: Up and Running, (1st E*dition), O'Reilly Media.

5. Elisabeth Robson, Eric Freeman, 2012. *Head First HTML and CSS, (2nd E*dition), O'Reilly Media.

Web Resources

1. https://www.placementpreparation.io/blog/best-books-to-learn-quantitative-aptitude/

2. https://www.exambazaar.com/blogpost/quantitative-aptitude-books

3. https://www.amazon.in/Quantitative-Aptitude-Competitive-Examinations-Aggarwal/dp/9352534026

4. https://www.w3schools

5. https://www.Learn-HTML.org

**MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	2	2	3	2	2	2	2
CO2	3	3	2	3	2	2	3	3	3	3	2	2
CO3	3	3	2	3	2	2	2	3	3	3	2	2
TOTAL	9	8	6	7	6	6	7	9	8	8	6	6
AVERAGE	3	2.7	2	2.3	2	2	2.3	3	2.7	2.7	2	2

3 – Strong, 2- Medium, 1- Low

Skill Enhancement Course SEC - I: Advanced Excel

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SU232SE1	1	-	1	-	2	2	30	25	75	100

Pre-requisite:

Students should know the basic knowledge in office automation / Excel.

Learning Objectives:

1. To learn the advanced features of Excel.
2. To summarise, analyse, explore, and present visualisations of data in the form of charts, graphs.

Course Outcomes

On the successful completion of the course, student will be able to**:**	
1.	use a wide range of advanced excel functions.	**K1**
2.	understand data validation rules to control data entry	**K2**
3.	presenting data in the form of charts and graphs.	**K3**

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
I	Basics of Excel - Customizing Common Options - Absolute and Relative Cells- Protecting and Un-protecting Worksheets and Cells - Working with Functions - Writing Conditional Expressions - Logical Functions - Lookup and Reference Functions - VlookUP with Exact Match, Approximate Match - Nested VlookUP with Exact Match - VlookUP with Tables, Dynamic Ranges - Nested VlookUP with Exact Match - Using VLookUP to Consolidate Data from Multiple Sheets.	6
II	Data Validations - Specifying a Valid Range of Values - Specifying a List of Valid Values- Specifying Custom Validations based on Formula - Working	6

	with Templates - Designing the Structure of a Template - Templates for Standardization of Worksheets - Sorting and Filtering Data -Sorting Tables - Multiple-level Sorting - Custom Sorting - Filtering Data for Selected View - Advanced Filter Options - Working with Reports Creating Subtotals - Multiple-level Subtotal.	
III	Creating Pivot Tables: Formatting and Customizing Pivot Tables - Advanced Options of Pivot Tables - Pivot Charts - Consolidating Data from Multiple Sheets and Files using Pivot Tables - External Data Sources - Data Consolidation Feature to Consolidate Data - Show Value as % of Row, % of Column, Running Total, Compare with Specific Field - Viewing Subtotal Under Pivot - Creating Slicers.	6
IV	More Functions: Date and Time Functions - Text Functions - Database Functions - Power Functions – Formatting using Auto Formatting Option for Worksheets - Using Conditional Formatting Option for Rows, Columns and Cells - WhatIf Analysis - Goal Seek - Data Tables - Scenario Manager.	6
V	Charts - Formatting Charts - 3D Graphs - Bar and Line Chart Together - Secondary Axis in Graphs - Sharing Charts with PowerPoint / MS Word, Dynamically - New Features of Excel Sparklines, Inline Charts, Data Charts - Overview of all the New Features.	6

Text book

Greg Harvey, 2018. *Excel 2019 All-in-One For Dummies,* (1ˢᵗ Edition), For Dummies.

Self study	**Unit V:** Formatting Charts

Reference Book

1. Bill Jelen and Michael Alexander, 2019. *Microsoft Excel 2019 Pivot Table Data Crunching,* (1ˢᵗ Edition), McGraw-Hill.

2. Michael Alexander and Richard Kusleika, 2018. *Excel 2019 Bible*, (1ˢᵗ Edition), Wiley.

3. Paul McFedries, 2019. *Excel 2019 Formulas and Functions*, (1st Edition), Microsoft Press.

4. Curtis Frye, 2019. *Microsoft Excel 2019 Step by Step*, (1st Edition). Microsoft Press.

5. Ken Bluttman, 2015. *Excel Formulas and Functions for Dummies*. (1st Edition), For Dummies.

Web Resources

1. https://www.shastacoe.org/uploaded/Dept/it/training_docs/Excel/Excel_Advanced_Training_Packet.pdf

2. https://sscstudy.com/advance-excel-notes-pdf-download/

3. https://www.tutorialspoint.com/advanced_excel/advanced_excel_tutorial.pdf

4. http://www.mcrhrdi.gov.in/group1-2019/Reading%20Material/IT/Adv.Excel%20-%20Handbook(7-6-17).pdf

5. https://www.guru99.com/introduction-to-microsoft-excel.html

**MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	2	2	3	3	3	2	3	2
CO2	3	2	3	3	2	2	3	3	2	3	2	2
CO3	3	2	2	3	2	3	2	2	3	3	2	3
TOTAL	9	7	8	8	6	7	8	8	8	8	7	7
AVERAGE	3	2.3	2.6	2.6	2	2.3	2.6	2.6	2.6	2.8	2.3	2.3

3 – Strong, 2- Medium, 1- Low

Life Skill Training I: Catechism
Course Code: UG232LC1

Hours	Credit	Total Hours	Total Marks
1	1	30	100

Objectives:
1. To develop human values through value education
2. To understand the significance of humane and values to lead a moral life
3. To make the students realize how values lead to success

Course Outcome	Upon completion of this course the students will be able to
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values

Unit I
Value Education:
        Human Values – Types of Values – Growth – Components – Need and Importance
Bible Reference: Matthew: 5:3-16
Unit II
Individual Values: Esther
        Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life
Bible Reference: Esther 8:3-6
Unit III
Family Values: Ruth the Moabite
         Respecting Parents – Loving Everyone – Confession – True Love
Bible Reference: Ruth 2:10-13
Spiritual Values: Hannah
        Faith in God – Wisdom – Spiritual Discipline – Fear in God – Spiritually Good Deeds
Bible Reference: 1 Samuel 1:24-28
Unit IV
Social Values: Deborah
        Good Behaviour – Devotion to Teachers – Save Nature – Positive Thoughts –The Role of Youth in Social Welfare
Bible Reference: Judges 4:4-9
Unit V
Cultural Values: **Mary of Bethany**
        Traditional Culture – Changing Culture – Food – Dress – Habit – Relationship – Media – The Role of Youth
Bible Reference: Luke 10:38-42
Text Book
Humane and Values. Holy Cross College (Autonomous), Nagercoil
The Holy Bible

SEMESTER I & II
Life Skill Training I: Moral
Course Code: UG232LM1

Hours	Credit	Total Hours	Total Marks
1	1	30	100

Objectives:
1. To develop human values through value education
2. To understand the significance of humane and values to lead a moral life
3. To make the students realize how values lead to success

Course Outcome	Upon completion of this course the students will be able to
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values

Unit I
Value Education:
　　　　Introduction – Limitations – Human Values – Types of Values – Aim of Value Education – Growth – Components – Need and Importance
Unit II
Individual Values:
　　　　Individual Assessment – Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life
Unit III
Family Values:
　　　　Life Assessment – Respecting Parents – Loving Everyone – Confession – True Love
Unit IV
Spiritual Values:
　　　　Faith in God – Wisdom – Spiritual Discipline – Fear in God – Spiritually Good Deeds

Unit V
Social Values:
　　　　Good Behaviour – Devotion to Teachers – Save Nature – Positive Thoughts – Drug Free Path – The Role of Youth in Social Welfare
Unit VI
Cultural Values:
　　　　Traditional Culture – Changing Culture – Food – Dress – Habit – Relationship – Media – The Role of Youth
Text Book
Humane and Values. Holy Cross College (Autonomous), Nagercoil