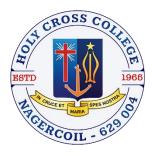# Holy Cross College (Autonomous), Nagercoil

Kanyakumari District, Tamil Nadu.

Accredited with A⁺ by NAAC - IV Cycle – CGPA 3.35

Affiliated to

Manonmaniam Sundaranar University, Tirunelveli

Semester I & II

UG Guidelines & Syllabus

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

2024-2027

(With effect from the academic year 2024-2025)

Issued from

THE DEANS' OFFICE

IU 1

Vision

The Department of Artificial Intelligence and Data Science aims to empower women, with global insight and ecological awareness. Our integrated curriculum focuses on developing advanced AI and data science skills, fostering ethical and socially responsible professionals committed to sustainable and harmonious societal advancements.

Mission

1. To deliver a comprehensive and state-of-the-art education in Artificial Intelligence and Data Science, preparing students for excellence in the global tech arena.
2. To cultivate a strong ethical foundation to apply AI and DS in ways that are beneficial to society.
3. To encourage interdisciplinary collaboration and research, fostering innovation and addressing complex challenges through advanced techniques.
4. To empower students with leadership and entrepreneurial skills to become influential figures in the technology sector.
5. To integrate global awareness and ecological sustainability into the curriculum by developing AI solutions to create environmental and societal impacts.

Graduate Attributes

Graduates of our College develop the following attributes during the course of their studies.

➢ **Creative thinking:**

Equipping students with hands-on-training through skill-based courses and promote startup.

➢ **Personality development:**

Coping with increasing pace and change of modern life through value education, awareness on human rights, gender issues and giving counselling for the needful.

➢ **Environmental consciousness and social understanding:**

Reflecting upon green initiatives and understanding the responsibility to contribute to the society; promoting social and cultural diversity through student training and service-learning programmes.

➢ **Communicative competence:**

Offering effective communication skills in both professional and social contexts through bridge courses and activities of clubs and committees.

➢ **Aesthetic skills:**

Engaging mind, body and emotions for transformation through fine arts, meditation and exercise; enriching skills through certificate courses offered by Holy Cross Academy.

➢ **Research and knowledge enrichment:**

Getting in-depth knowledge in the specific area of study through relevant core papers; ability to create new understanding through the process of critical analysis and problem solving.

➢ **Professional ethics:**

Valuing honesty, fairness, respect, compassion and professional ethics among students. The students of social work adhere to the *National Association of Social Workers Code of Ethics*

➢ **Student engagement in the learning process:**

Obtaining extensive and varied opportunities to utilize and build upon the theoretical and empirical knowledge gained through workshops, seminars, conferences, industrial visits and summer internship programmes.

➢ **Employability:**

Enhancing students in their professional life through Entrepreneur development, Placement & Career guidance Cell.

> **Women empowerment and leadership:**
Developing the capacity of self-management, team work, leadership and decision making through gender sensitization programmes.

Programme Educational Objectives (PEOs)

PEOs	Upon completion of B.A/B.Sc. degree programme, the graduates will be able to	Mission addressed
PEO1	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
PEO2	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.	M2, M3, M4 & M5
PEO3	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:	PEOs addressed
PO1	obtain comprehensive knowledge and skills to pursue higher studies in the relevant field of science.	PEO1
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.	PEO2
PO4	enhance leadership qualities, team spirit and communication skills to face challenging competitive examinations for a better developmental career.	PEO1 & PEO3
PO5	communicate effectively and collaborate successfully with peers to become competent professionals.	PEO2 & PEO3
PO6	absorb ethical, moral and social values in personal and social life leading to highly cultured and civilized personality	PEO2 & PEO3
PO7	participate in learning activities throughout life , through self-paced and self-directed learning to develop knowledge and skills.	PEO1 & PEO3

Programme Specific Outcomes (PSOs)

PSOs	Upon completion of the B.Sc. Artificial Intelligence and Data Science, the graduates will be able to:	Mapping with POs
PSO1	evolve AI and Data Science based domain knowledge and skills to pursue advanced studies in the field and integrate these techniques with emerging technologies.	PO1
PSO2	develop innovative ideas in AI and data science to enhance entrepreneurial and employability skills for real-world challenges.	PO2
PSO3	cultivate versatile skills for problem-solving, technical proficiency, effective communication, and community engagement through self-directed activities.	PO4 & PO7
PSO4	communicate and collaborate proficiently to become competent AI professionals, while addressing biases, and upholding data privacy regulations.	PO5 & PO6
PSO5	reflect on green initiatives and leverage AI to address economic challenges while promoting sustainable development.	PO3

Mapping of POs and PSOs

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO1	M	S	S	S	S
PO2	S	M	S	S	S
PO3	M	S	S	S	M
PO4	S	S	M	S	S
PO5	S	M	S	M	S
PO6	M	S	S	M	S
PO7	S	S	M	S	S

S – Strong, M- Medium

Components

Part III (Major and Elective)

Courses	Components	No. of Courses x Maximum Mark	Total
Core	Theory Courses	8x100	800
	Lab Courses	6x100	600
	Research Project	1 x100	100
Elective	Theory Courses	4x100	400
Discipline Specific Elective	Theory Courses	4 x 100	400
Total Marks			**2300**

Course Structure
Distribution of Hours and Credits
Curricular Courses

Course	S I	S II	S III	S IV	S V	S VI	Total H	Total 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 (5) + 5 (5)	5 (5) + 5 (5)	5 (4) + 5 (4) + 5 (4) + 5 (4)	6(5) + 6(5) + 6(4)	78	**70**
Core Research Project								
Elective Course	4 (3)	4 (3)	4 (3)	4 (3)	4 (3) + 4 (3)	5 (3) + 5 (3)	34	**24**
Part IV								
Non-major Elective	2 (2)	2 (2)					4	**4**
Skill Enhancement Course		2 (2)	2(2) + 2 (2)	2 (2)			8	**8**
Foundation Course	2 (2)						2	**2**
Environmental Studies				2 (2)			2	**2**
Value Education					2 (2)		2	**2**
Internship					(2)		-	**2**
Professional Competency Skill						2 (2)	2	**2**
Total	**30 (23)**	**30 (23)**	**30 (23)**	**30 (23)**	**30 (26)**	**30 (22)**	**180**	**140**

IU 4

Co-curricular Courses

Course	S I	S II	S III	S IV	S V	S VI	Total
Life Skill Training (LST)	-	(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
Massive Open Online Courses (MOOCs)		(1)		(1)			2
Student Training Activity: Clubs & Committees / NSS				(1)			1
Community Engagement Activity: Reaching the Unreached Neighbourhood (RUN)				(1)			1
Human Rights Education (HRE)					(1)		1
Gender Equity Studies (GES)						(1)	1
Total							**14**

Total number of Compulsory Credits = Curricular credits + Co-curricular credits: **140 + 14**

Courses Offered

SEMESTER I

Course	Course Code	Title of the Course	Credits	Hours/ Week
Part I	TU241TL1 FU241FL1	Language: Tamil French	3	6
Part II	EU241EL1	English: A Stream		
	EU241EL2	English: B Stream	3	6
	EU241EL3	English: C Stream		
Part III	IU241CC1	Core Course I: Programming for Problem Solving	5	5
	IU241CP1	Core Lab Course I: Problem Solving using C Lab	5	5
	IU241EC1	Elective Course I: Mathematical Foundations for Artificial Intelligence	3	4
Part IV	IU241NM1	Non-Major Elective NME I: Cyber Forensics	2	2
	IU241FC1	Foundation Course FC: Web Designing	2	2
		Total	**23**	**30**

SEMESTER II

Course	Course Code	Title of the Course	Credits	Hours/ Week
Part I	TU242TL1 FU242FL1	Language: Tamil French	3	6
Part II	EU242EL1	English: A Stream		
	EU242EL2	English: B Stream	3	6
	EU242EL3	English: C Stream		
Part III	IU242CC1	Core Course II: Python Programming	5	5

	IU242CP1	Core Lab Course II: Python Programming Lab	5	5
	IU242EC1	Elective Course II: Discrete Mathematics	3	4
Part IV	IU242NM1	Non-Major Elective NME II: Understanding Internet	2	2
	IU242SE1	Skill Enhancement Course SEC I: Quantitative Aptitude	2	2
		Total	**23**	**30**

SEMESTER III

Course	Course Code	Title of the Course	Credits	Hours / Week
Part I	TU243TL1 FU243FL1	Language: Tamil French	3	6
Part II	EU243EL1	English	3	6
Part III	IU243CC1	Core Course III: Data Structures	5	5
	IU243CP1	Core Lab Course III: Data Structures Lab	5	5
	IU243EC1	Elective Course III: Artificial Intelligence	3	4
Part IV	IU243SE1	Skill Enhancement Course SEC-II: Basics of DBMS	2	2
	UG24CSE1	Skill Enhancement Course SEC-III: Fitness for Wellbeing	2	2
		Total	**23**	**30**

SEMESTER IV

Course	Course Code	Title of the Course	Credits	Hours / Week
Part I	TU244TL1 FU244FL1	Language: Tamil French	3	6
Part II	EU244EL1	English	3	6
Part III	IU244CC1	Core Course IV: Data Science Using R	5	5
	IU244CP1	Core Lab Course IV: Data Science Using R Lab	5	5
	IU244EC1	Elective Course IV: Statistical Methods and its Applications	3	4
Part IV	UG24CSE2	Skill Enhancement Course SEC-IV: Digital Fluency	2	2
	UG244EV1	Environmental Studies (EVS)	2	2
		Total	**23**	**30**

SEMESTER V

Course	Course Code	Title of the Course	Credits	Hours/ Week
Part III	IU245CC1	Core Course V: Machine Learning Techniques	4	5
	IU245CC2	Core Course VI: Computer Graphics	4	5
	IU245CP1	Core Lab Course V: Machine Learning Lab	4	5

Course	Course Code	Title of the Course	Credits	Hours/Week
	IU245RP1	Core Research Project	4	5
	IU245DE1	Discipline Specific Elective I: a) Data Communication and Networks		
	IU245DE2	Discipline Specific Elective I: b) Image Processing	3	4
	IU245DE3	Discipline Specific Elective I: c) Pattern Recognition		
	IU245DE4	Discipline Specific Elective II: a) Data Mining		
	IU245DE5	Discipline Specific Elective II: b) Big Data Analytics	3	4
	IU245DE6	Discipline Specific Elective II: c) Cloud Computing		
Part IV	IU245VE1	Value Education	2	2
	IU245IS1	Internship	2	-
		Total	**26**	**30**

SEMESTER VI

Course	Course Code	Title of the Course	Credits	Hours/Week
	IU246CC1	Core Course VII: Intelligent System	5	6
	IU246CC2	Core Course VIII: Computer Vision	5	6
	IU246CP1	Core Lab Course VI: Natural Language Processing Lab	4	6
	IU246DE1	Discipline Specific Elective III: a) Software Project Management		
	IU246DE2	Discipline Specific Elective III: b) Distributed Computing	3	5
Part III	IU246DE3	Discipline Specific Elective III: c) Virtual Reality Technology		
	IU246DE4	Discipline Specific Elective IV: a) Mobile Adhoc Network		
	IU246DE5	Discipline Specific Elective IV: b) IOT and its Applications	3	5
	IU246DE6	Discipline Specific Elective IV: c) Robotics and its Applications		
Part IV	IU246PS1	Professional Competency Skill	2	2
		Total	**22**	**30**
		TOTAL	**140**	**180**

Specific Value-Added Course

Semester	Course Code	Title of the Course	Credits	Total Hours
I	IU241V01	Object Oriented Concepts	1	30
I	IU241V02	Programming using JAVA	1	30
I	IU241V03	System Software and Operating Systems	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.

i. 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 2 x 6 (Internal choice)	12	Part B 5 x 6 (Internal choice)	30
Part C 2 x 12 (Internal choice)	24	Part C 5 x 12 (Internal choice)	60
Total	**40**	**Total**	**100**

ii. 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	75
Minor Practical / Spotters /Record	
Total	**75**

Core Research Project

Ratio of Internal and External = 25:75

Components	Marks
Internal	25
External	
Core Research Project Report	40
Viva voce	35
Total	**100**

Part - IV

i. Non-major Elective, Skill Enhancement Course I & II, Foundation 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) – 25 marks	10
Quiz (2) – 20 marks	5
Assignment: (Model Making, Exhibition, Role Play, Album, Group Activity, etc. (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 4 (Open choice any **Five** out of **Eight**)	20
Part C 1 x 9 (Open choice **One** out of **Three**)	9	Part C 5 x 9 (Open choice any **Five** out of **Eight**)	45
Total	**25**	**Total**	**75**

ii. **Skill Enhancement Course III & IV**

Digital Fluency

Components	Marks
Internal	
Quiz (15 x 1)	15
Lab Assessment (5 x 2)	10
Total	**25**
External	
Practical (2 x 25)	50
Procedure	25
Total	**75**

Fitness and Wellbeing

Components	Marks
Internal	
Quiz (15 x 1)	15
Exercise (2 x 5)	10
Total	**25**
External	
Written Test: Part A: Open choice – 5 out of 8 questions (5 x 5)	25
Part B: Open choice – 5 out of 8 questions (5 x 10)	50
Total	**75**

iii. **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 4 (Open choice any **Five** out of **Eight**)	20

Part C 1 x 9 (Open choice One out of **Three**)	9	Part C 5 x 9 (Open choice any **Five** out of **Eight**)	45
Total	**25**	**Total**	**75**

iv. Internship

Components	Marks
Industry Contribution	50
Report & Viva-voce	50
Total	**100**

Co-Curricular Courses:

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

Internal Components

Component	Marks
Project - Album on current issues	25
Group Activity	25
Total	**50**

External Components

Component	Marks
Written Test: Open choice – 5 out of 8 questions (5 x 10)	50
Total	**50**

ii. Skill Development Training - Certificate Course:

Components	Marks
Attendance & Participation	50
Skill Test	50
Total	**100**

iii.Field Project:

Components	Marks
Field Work	50
Field Project Report & Viva-voce	50
Total	**100**

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

Components	Marks
Internal	25
External	75
Total	**100**

v. Student Training Activity: Clubs and Committees

Compulsory for all I & II year students (1 credit).

Component	Marks
Attendance	25
Participation	75
Total	**100**

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

Components	Marks
Attendance & Participation	50

Field Project	50
Total	**100**

1. Outcome Based Education (OBE)

(i) Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

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

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

Programme	Assessment	Lower Order Thinking									Higher order thinking			Total number of questions
		K1			K2			K3			K4, K5, K6			
	Part	A	B	C	A	B	C	A	B	C	A	B	C	
I UG	Internal	2	1	-	1	1	1	1	-	1	-	-	-	**8**
	External	5	2	1	3	2	2	2	1	2	-	-	-	**20**
II UG	Internal	1	1	-	1	1	1	1	-	1	1	-	-	**8**
	External	5	1	1	4	1	1	-	3	1	1	-	2	**20**
III UG	Internal	1	-	-	1	-	1	1	1	1	1	1	-	**8**
	External	5	1	1	4	1	1	-	3	1	1	-	2	**20**

The levels of assessment are flexible and it should assess the cognitive levels and outcome attainment.

2. 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.

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

3. 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.

IU 11

4. **Grading System**
    For the Semester Examination:
    Calculation of Grade Point Average for End Semester Examination:

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the course}}{\text{Sum of the credits of the courses (passed) in a semester}}$$

For the entire programme:

Cumulative Grade Point Average (CGPA) $\Sigma n \Sigma i C_{ni} G_{ni} / \Sigma n_i \Sigma i C_{ni}$

$$\text{CGPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

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

5. **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	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
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.

SEMESTER I
CORE COURSE I: PROGRAMMING FOR PROBLEM SOLVING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241CC1	4	1	-	-	**5**	**5**	**75**	**25**	**75**	**100**

Pre-requisite:
> Basic computer operation skills.

Learning Objectives:
1. To recognize the importance of programming languages, recall memory management and identify bugs in C programs.
2. To apply problem-solving techniques, implement memory-efficient modularization and develop C programs with varied data types.

Course Outcomes

On the successful completion of the course, students will be able to:	
1.	remember the fundamentals of C programming and describe the program development process.	**K1&K2**
2.	prepare solutions for problems using branching and looping statements.	**K3**
3.	decompose a problem into functions and synthesize a complete program using divide and conquer approach.	**K3**
4.	formulate algorithms and programs using arrays, pointers and structures	**K3**
5.	analyse various programming constructs and structures.	**K4**

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

Units	Contents	No. of Hours
I	**INTRODUCTION TO COMPUTING:** Introduction - Art of Programming through Algorithms and Flowcharts. Overview of C: History and importance of C- Basic structure of C program- Executing a C program. Constants, Variables and Data Types: Introduction- Character Set- C Tokens- Declaration of Variables- Assigning Values to Variables- Defining Symbolic Constants. Managing Input and Output Operations - Operators and Expressions.	**15**
II	**CONTROL STRUCTURES**: Decision Making and Branching: Introduction- Decision Making with IF Statement- Simple IF Statement- IF-ELSE Statement- Nesting of IF-ELSE Statements- ELSE IF Ladder- Switch statement- The Conditional Operator- goto statement. Decision Making and Looping: Introduction- while Statement- do statement- for statement-Nested control structures- break statement- continue statement.	**15**
III	**Arrays and Strings:** Defining an array - Processing an array - Multidimensional arrays - Searching algorithm - Linear search - Sorting algorithm - Bubble sort algorithm - Strings - Defining a string - Initialization of strings- Reading and writing a string- Processing the strings.	**15**
IV	**Functions and Pointers:** Functions- Overview- Defining a function- Accessing a function- Function prototypes- Passing arguments to a function- Passing arrays to functions- Recursion. Pointers: Introduction- Declaring Pointer Variables- Initialization of Pointer variables- accessing a Variable through its Pointers- Dynamic memory allocation	**15**

V	Structures and File Management: Defining a structure- Declaring structure variables-Accessing structure members- Array of structures- Structures and pointers. File Management in C: Introduction- Defining and opening a file- closing a file- Input/output and Error Handling on Files.		**15**
	Total		**75**

Self-study	Multidimensional arrays, Array of structures.

Textbooks:
1. Byron Gottfried, 2016. *Schaum's Outline of Programming with C*, 3rd Edition, McGraw Hill Education.
2. Balagurusamy E, 2019. *Programming in ANSI C*, 8th Edition, McGraw Higher Education.

Reference Books:
1. Yashavant Kanetkar, 2016. *Let Us C*, 15th Edition, BPB Publications.
2. Herbert Schildt, 2017. *The Complete Reference C*, 4th Edition, McGraw Hill Education.
3. Beulah Christalin Latha, Anuja Beatrice, Carolin Jeeva & Anita Sofia, 2018. *Fundamentals of Computing and Programming*, 1st Edition, Pearson.
4. Sumitabha Das, 2018. *Computer Fundamentals and C Programming*, 18th Edition, McGraw Hill Education.
5. Stephen G. Kochan, 2015. *Programming in C*, 4th Edition, Addison-Wesley Professional.

Web Resources:
1. http://www.geeksforgeeks.org/c-programming-language/
2. http://www.tutorialspoint.com/cprogramming/index.htm
3. http://www.programiz.com/c-programming
4. http://www.learn-c.org/
5. http://en.wikibooks.org/wiki/C_Programming

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2	1	2	3	2	2	2	1
CO2	3	3	1	2	2	1	2	3	3	2	2	1
CO3	3	3	1	2	2	1	2	3	3	2	2	1
CO4	3	3	1	2	2	1	2	3	3	2	2	1
CO5	3	3	1	2	2	1	2	3	3	2	2	1
TOTAL	15	15	5	10	10	5	10	15	15	10	10	5
AVERAGE	3	3	1	2	2	1	2	3	3	2	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
CORE LAB COURSE I: PROBLEM SOLVING USING C LAB

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241CP1	-	1	4	-	**5**	**5**	**75**	**25**	**75**	**100**

Pre-requisite:
Basic computer operation skills.
Learning Objectives:
1. To develop proficiency in fundamental programming concepts and structures using C.
2. To apply advanced programming techniques to solve complex problems.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	translate given algorithms to a working and correct program.	**K2&K3**
2.	identify and correct logical errors encountered at run time.	**K2&K3**
3.	create iterative as well as recursive programs.	**K6**
4.	represent data in arrays, strings and structures and manipulate them through a program.	**K2&K3**
5.	declare pointers of different types and use them in defining self-referential structures.	**K2&K3**

K2 - Understand; **K3** – Apply; **K6** - Create

List of Exercises	No. of Hours
Implement the following exercises using C language: 1. Implementation of Basic C programs. 2. Simple computational problems using arithmetic expressions and operators. 3. Problem solving using branching and logical expressions. 4. Iterative problems using Loops, while and for loops. 5. Implementation of linear searching, bubble sort, and Matrix Manipulation using Arrays. 6. Implementation of Text Processing using Strings. 7. Find roots of a quadratic equation using functions and recursion. 8. Implementation of basic file operations.	**75**

Textbooks:
1. Byron Gottfried, 2016. *Schaum's Outline of Programming with C*, 3rd Edition, McGraw Hill Education.
2. Balagurusamy E, 2019. *Programming in ANSI C*, 8th Edition, McGraw Higher Education.

Reference Books:
1. Yashavant Kanetkar, 2016. *Let Us C*, 15th Edition, BPB Publications.
2. Herbert Schildit, 2017. *The Complete Reference C*, 4th Edition, McGraw Hill Education.
3. Beulah Christalin Latha, Anuja Beatrice, Carolin Jeeva & Anita Sofia, 2018. *Fundamentals of Computing and Programming*, 1st Edition, Pearson.
4. Sumitabha Das, 2018. *Computer Fundamentals and C Programming*, 18th Edition, McGraw Hill Education.
5. Karl Beecher, 2017. *Computational Thinking: A Beginner's Guide to Problem Solving and Programming*, 1st Edition, BCS Learning & Development Limited.

Web Resources:
1. http://www.geeksforgeeks.org/c-programming-language/

2. http://www.tutorialspoint.com/cprogramming/index.htm
3. http://www.programiz.com/c-programming
4. http://www.learn-c.org/
5. http://en.wikibooks.org/wiki/C_Programming

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	2	3	1	3	3	3	3	2	1
CO2	3	3	1	2	3	1	3	3	3	3	2	1
CO3	3	3	1	2	3	1	3	3	3	3	2	1
CO4	3	3	1	2	3	1	3	3	3	3	2	1
CO5	3	3	1	2	3	1	3	3	3	3	2	1
TOTAL	15	15	5	10	15	5	15	15	15	15	10	5
AVERAGE	3	3	1	2	3	1	3	3	3	3	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
ELECTIVE COURSE I: MATHEMATICAL FOUNDATIONS FOR ARTIFICIAL INTELLIGENCE

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241EC1	**3**	**1**	**-**	**-**	**3**	**4**	**60**	**25**	**75**	**100**

Pre-requisite:
Knowledge of basic principles of logic, operations on sets.

Learning Objectives:
1. To utilize logical connectives to form and evaluate complex logical statements.
2. To apply basic Boolean algebra laws to simplify logical expressions.
3. To solve linear systems using the Gauss Elimination Method.

Course Outcomes

On the successful completion of the course, students will be able to:	
1.	understand the basics of computers and the number conversions	**K1 & K2**
2.	analyse and evaluate logical arguments and statements using formal logical principles.	**K4 & K5**
3.	acquire knowledge of lattice structures and Boolean algebra, including the application of Boolean algebra laws and the principle of duality to solve logical problems.	**K2 & K3**
4.	understand the basic concepts of set theory and relations including inclusion-exclusion principles, types of relations and demonstrate the ability to apply these concepts in problem-solving.	**K2 & K3**
5.	To learn various methods to solve algebraic and transcendental equations.	**K1 & K2**

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

Units	Contents	No. of Hours
I	**Introduction to Programming:** Introduction to Computers - Computer characteristics - Hardware vs software – Types of Computers- System Software and Application Software- Types of programming languages Number Systems and Base Conversions- 1's and 2's complement of a Binary Number- Binary Coded Decimal.	**12**
II	**Propositional Logic in AI:** Statement (Propositions) – Laws of Formal Logic – Basic Set of Logical Operators / Operations – Conjunction – Disjunction – Negation – Prepositions and Truth Tables – Connectives – Compound Propositions – Conditional Statement – Converse, Contrapositive and Inverse – Biconditional Statement – Algebra of Propositions – Propositional Functions – Tautologies and Contradictions – System Specifications (Consistency) – Principle of Substitution **Chapter 3**: Sections 3.2 to 3.8 (Pages 122-133)	**12**
III	**Lattices Theory and Boolean Algebra**: Introduction- Definition (Partially Ordered Set-Poset)- Distributive Lattice- Complemented Lattice- Definition of Boolean Algebra-Basic Boolean Algebra Laws- Definition (Principle of Duality). **Chapter 4 :** Section 4.1,4.2, 4.5, 4.6, 4.8-4.10 (Pages 4.1-4.2, 4.6-4.7, 4.15 – 4.25)	**12**
IV	**Set Theory and Relations:** Introduction- Set-Finite Set-Cardinality - Operations on Sets- Union- Intersection- Disjoint Sets- Difference Set-	**12**

	Complement Set - Principle of Inclusion and Exclusion - Ordered Pair - Binary Relation- Types of Relations- Symmetric Relation-Anti-Symmetric Relation-Reflexive Relation- Transitive Relation- Equivalence Relation- Partially Ordering Relation **Chapter 3:** Section: 3.1-3.4, 3.10 – 3.14, 3.16, 3.17, 3.22, 3.26 – 3.31 (Pages: 3.1-3.3, 3.7-3.11, 3.15-3.20)	
V	**Basic Numerical Methods in AI:** Introduction - Iteration Method - Bisection Method - Newton Raphson Method - Linear System of Equations - Gauss Elimination Method. **Chapter 1**: 1.0, 1.2, 1.4, 1.6, 2.3	**12**
	Total	**60**

Self-study	Truth Table, Biconditional Statement

Textbooks:
1. Deborah Morley and Charles S. Parker; Fundamentals of Computers; Cengage Learning, India edition; 2009. (Unit-1)
2. Chakraborty S.K. and Sarkar B.K., 2011. *Discrete Mathematics*, 1st Edition, Oxford University. (Unit 2)
3. Geetha P., 2023. *Discrete Mathematics*, 2nd Edition, SciTech Publications (India) Pvt. Ltd. (Units 3,4)
4. Arumugam, S., Thangapandi Isaac, S., Soma Sundaram, A. (2013). Numerical Analysis with Programming in C. (4th edition). Bombay: New Gamma Publishing House. (Unit 5)

Reference Books:
1. Liu C. L, 2018. *Elements of Discrete Mathematics*, 2nd Edition, McGraw Hill.
2. Norman Biggs L., 2011. *Discrete Mathematics*, 1st Edition, Pearson, USA.
3. Kenneth H. Rosen, 2022. *Discrete Mathematics and its Applications*, 8th Edition, McGraw Hill.
4. Santha. S, 2011. *Discrete Mathematics,* (1st Edition), Technology University Series.

Web Resources:
1. https://www.slideshare.net/asadfaraz4/intro-to-discrete-mathematics
2. https://onlinecourses.nptel.ac.in/noc23_cs109/preview
3. https://www.youtube.com/watch?v=amaH38_mXK4
4. https://www.brilliant.org
5. https://www.youtube.com/watch?v=aMzGSDqSrv8

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	3	2	2	3	2	2	2	2
CO3	2	2	2	2	2	2	2	3	3	2	2	2
CO4	2	3	2	3	3	2	2	3	2	2	2	2
CO5	2	2	2	2	2	2	2	2	2	2	3	2
TOTAL	12	12	10	12	12	10	10	14	11	10	11	10
AVERAGE	2.4	2.4	2	2.4	2.4	2	2	2.8	2.2	2	2.2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER I
NON-MAJOR ELECTIVE NME I: CYBER FORENSICS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241NM1	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
Fundamental knowledge of computer systems, networks, and operating systems.
Learning Objectives:
1. To understand the definition and core principles of computer forensics fundamentals.
2. To study the various types of computer forensics evidence and their significance in investigations.

Course Outcomes

	On the successful completion of the course, students will be able to:	
1.	recall and describe the definition of computer forensics fundamentals.	K1 & K2
2.	apply and analyze the different types of computer forensics technology.	K4
3.	analyse various computer forensics systems.	K4
4.	apply the methods for data recovery, evidence collection and data seizure.	K3
5.	gain knowledge of duplication and preservation of digital evidence.	K1

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

Units	Contents	No. of Hours
I	Overview of Computer Forensics Technology: Computer Forensics Fundamentals: Use of Computer Forensics in Law Enforcement - Computer Forensics Assistance to Human Resources/Employment Proceedings - Computer Forensics Services - Benefits of professional Forensics Methodology - Steps taken by Computer Forensics Specialists. Forensics Technology -Types of Law Enforcement.	6
II	Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined - Data Backup and Recovery - The Role of Backup in Data Recovery - The Data Recovery Solution. Evidence Collection and Data Seizure: Collection Options - Obstacles - Types of Evidence - The Rules of Evidence -Controlling Contamination: The chain of custody.	6
III	Duplication and Preservation of Digital Evidence: Processing steps - Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication - Practical Consideration - Practical Implementation.	6
IV	Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel - Forensic Identification and Analysis of Technical Surveillance Devices.	6
V	Reconstructing Past Events: How to Become a Digital Detective - Useable File Formats - Unusable File Formats - Converting Files. Networks: Network Forensics Scenario - a technical approach - Destruction of E–Mail - Damaging Computer Evidence - Documenting the Intrusion on Destruction of Data - System Testing.	6
	Total	**30**

Self-study	Types of Business Computer Forensic Technology, How to Become a Digital Detective

Textbooks:
1. John Vacca R., 2002. *Computer Forensics: Computer Crime Investigation*, 3rd Edition, Firewall Media.
2. Marjie Britz T., 2020. *Computer Forensics and Cyber Crime: An Introduction*, 4th Edition, Pearson.

Reference Books
1. Nelson, Phillips Enfinger, Steuart, 2004. *Computer Forensics and Investigations*, 1st Edition, Cengage Learning.
2. Anthony Semmes and Brian Jenkinson, 2007. *Forensic Computing: A Practitioner Guide*, 2nd Edition, Springer–Verlag London Limited.
3. Robert M. Slade, 2005. *Software Forensics Collecting Evidence from the Scene of a Digital Crime*, 1st Edition, Tata McGraw-Hill.
4. EC-Council, 2009. *Computer Forensics: Investigating Data and Image Files*, 1st Edition, Cengage Learning.
5. Bill Nelson, Amelia Phillips, Christopher Steuart, 2015. *Guide to Computer Forensics and Investigations*, 5th Edition, Cengage Learning.

Web Resources:
1. https://www.vskills.in/
2. https://www.hackingarticles.in/best-of-computer-forensics-tutorials/
3. https://books.google.co.in/books/about/Cyber_Forensics.html
4. https://en.wikipedia.org/wiki/Computer_forensics
5. https://archive.org/details/computerforensic

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	2	2	2	2	3	3	2	2	1
CO2	3	3	1	2	2	2	2	3	3	2	2	1
CO3	3	3	1	2	2	2	2	3	3	2	2	1
CO4	3	3	1	2	2	2	2	3	3	2	2	1
CO5	3	3	1	2	2	2	2	3	3	2	2	1
TOTAL	15	15	5	10	10	10	10	15	15	10	10	5
AVERAGE	3	3	1	2	2	2	2	3	3	2	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
FOUNDATION COURSE: WEB DESIGNING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU241FC1	**1**	**1**	**-**	**-**	**2**	**2**	**30**	**25**	**75**	**100**

Pre-requisite:
Basic understanding about Websites and Web pages.

Learning Objectives:
1. To understand the design rules in constructing web pages and sites.
2. To enable the students to learn the basic working scheme of the Internet and World Wide Web.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	understand and identify the elements and attributes in a web page.	**K1&K2**
2.	design web pages using DHTML and Cascading StyleSheets.	**K3**
3.	design and construct web sites using tables.	**K3**
4.	apply the attributes in designing web pages	**K3**
5.	analyze a web page and identify its elements and attributes.	**K4**

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

Units	Contents	No. of Hours
I	**Introduction to HTML:** Designing a Home page – History of HTML – HTML generations- HTML Documents-Anchor tag –Hyperlinks –Sample HTML documents.	**6**
II	**Head and Body section:** Header Section –Title-Prologue-Links - Colorful web page –Comments lines Designing the body: Heading printing –Aligning the headings-Horizontal rule- paragraph-Tab settings-Image and pictures-Embedding PNG format Images.	**6**
III	**Ordered and unordered lists:** List-Unordered lists- headings in a list – ordered lists- Nested lists. Table handling: Tables- table creation in HTML- Width of the Tables and cells-Cells spanning multiple rows/Columns- Coloring cells – Column specification.	**6**
IV	**Frames:** Frame set - Definition – Frame definition –Nested Frames Web Page Design Project: Frameset Definition – Animals – Birds – Fish. Forms: Action 15 attributes –Method attributes –Enctype attribute – Drop down list- sample forms.	**6**
V	**DHTML and Style sheets:** Defining styles – Elements of styles- Linking a style sheet to an HTML document –Inline styles Internal & External style sheets – Multiple styles.	**6**
	Total	**30**

Self-study	Coloring cells, Table Creation

Textbooks:
1. Xavier, C. 2010. *World Wide Web Design with HTML*. (23rd edition). New Delhi:TMH Publication.
2. Rizwan Ahmed, P. 2013. *Internet and its Application*. (2nd edition). Chennai: Margham Publications.

Reference Books

1. Paul J. Deitel, Deitel, 2008. *Internet & World Wide Web: How to Program.* (5thedition). PearsonEducation.
2. Raymond Greenlaw, Ellen Hepp. 2007. *Fundamentals of Internet and www*. (2ndedition). New Delhi: Tata McGrawHill.
3. Ivan Bayross. 2010. *HTML, DHTML, JavaScript, Perl CGI*. (4th edition). BPB Publications.
4. Kogent Learning Solutions Inc., 2012. *Web Technologies Black Book*. (New Edition). New Delhi: DreamTech Press Publishers.
5. David Pitt, 2014.*Modern Web Essential JavaScript & Html5*. (2nd edition), New Delhi: Infoq Publication.

Web Resources:

1. https://www.geeksforgeeks.org/how-to-design-a-web-page-in-html/
2. https://www.marsdevs.com/blogs/web-designing-using-html-and-css
3. https://www.w3schools.com/tags/tag_frame.asp
4. https://www.w3schools.com/html/default.asp
5. https://www.educba.com/design-web-page-in-html/

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	2	2	1	2	3	3	2	2	1
CO2	3	3	1	2	2	1	2	3	3	2	2	1
CO3	3	3	1	2	2	1	2	3	3	2	2	1
CO4	3	3	1	2	2	1	2	3	3	2	2	1
CO5	3	3	1	2	2	1	2	3	3	2	2	1
TOTAL	15	15	5	10	10	5	10	15	15	10	10	5
AVERAGE	3	3	1	2	2	1	2	3	3	2	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
SPECIFIC VALUE-ADDED COURSE I: OBJECT ORIENTED CONCEPTS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
IU241V01	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
A solid understanding of basic programming constructs, including variables, data types, loops, conditionals, and functions, in at least one programming language.

Learning Objectives:
1. To understand and apply core OOP principles.
2. To design and develop Object-Oriented programs.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	define object-oriented programming terminology and describe basic programming constructs.	**K1&K2**
2.	illustrate object relationships.	**K2**
3.	analyze code for OOP principles.	**K4**
4.	compare different OOP designs.	**K4**
5.	develop basic object-oriented programs.	**K3**

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

Units	Contents	No. of Hours
I	**Overview of C++ programming language:** Setting up C++ Development Environment (compiler, IDE) - Writing your first C++ program: Hello World - Basic syntax: variables - data types - operators - Hands-on exercises: Write simple programs to practice syntax.	6
II	**Control Flow and Functions:** Conditional statements - if, else if, else - Looping statements: for, while, do-while - Switch statement - Functions: declaration- definition- parameters- return types - Hands-on exercises: Write programs to demonstrate control flow and function concepts	6
III	**Object-Oriented Programming (OOP) Basics:** Introduction to Object-Oriented Programming in C++ - Classes and Objects - Constructors and methods - Encapsulation and access specifiers (public, private, protected) - Hands-on exercises: Create classes and objects- define methods.	6
IV	**Inheritance and Polymorphism Inheritance:** extending classes - Method overriding - Polymorphism: runtime and compile-time - Abstract classes and interfaces (pure virtual functions) - Hands-on exercises: Implement inheritance and polymorphism in C++ programs.	6
V	**Exception Handling and File I/O Handling exceptions:** try, catch, throw - Catching specific exceptions - File handling in C++: Reading from and writing to files - Hands-on exercises: Write programs to handle exceptions and work with files.	6
	Total	30

Self-study	File handling in C++: Reading from and writing to files.

Textbooks:
1. Bjarne Stroustrup, 2013. *The C++ Programming Language*, 4th Edition Addison-Wesley.
2. Grady Booch, 2007. *Object-Oriented Analysis and Design with Applications*, 3rd Edition, Addison-Wesley.

Reference Books
1. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, 1994. *Design Patterns:*

Elements of Reusable Object-Oriented Software, 1st Edition, Addison-Wesley.
2. Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, 2012. *C++ Primer*, 5th Edition, Addison-Wesley.
3. Scott Meyers, 2014. *Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++*, 1st Edition, O'Reilly Media.
4. Bjarne Stroustrup, 2014. *Programming: Principles and Practice Using C++*, 2nd Edition Addison-Wesley.
5. Andrew Koenig and Barbara E. Moo, 2000. *Accelerated C++: Practical Programming by Example*, 1st Edition, Addison-Wesley.

Web Resources:
1. https://www.geeksforgeeks.org/c-plus-plus/
2. https://en.cppreference.com/
3. https://www.learncpp.com/
4. https://learn.saylor.org

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
SPECIFIC VALUE-ADDED COURSE I: PROGRAMMING USING JAVA

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
IU241V02	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
A basic understanding of programming fundamentals, including variables, data types, control structures (such as loops and conditionals), and functions.

Learning Objectives:
1. To understand the basic concepts of Java.
2. To develop high quality, internally documented, well-structured object oriented program using Java.

Course Outcomes

On the successful completion of the course, students will be able to:	
1.	recall an describe the object-oriented programming concepts in JAVA.	**K1&K2**
2.	apply the relevant object-oriented concepts to implement a real time application with design patterns.	**K3**
3.	demonstrate the application of polymorphism in various ways.	**K2**
4.	illustrate the use of inheritance, exceptions, generics and collection.	**K2**
5.	develop applications with event-driven graphical user interface and file management.	**K3**

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

Units	Contents	No. of Hours
I	**Introduction to Java:** Overview of Java programming language - Setting up Java Development Environment (JDK, IDE) - Writing your first Java program: Hello World - Basic syntax: variables- data types- operators - Hands-on exercises: Write simple programs to practice syntax	**6**
II	**Control Flow:** Conditional statements: if, else if, else – Looping statements: for, while, do-while - Switch statement - Hands-on exercises: Write programs to demonstrate control flow concepts.	**6**
III	**Object-Oriented Programming (OOP) Basics:** Introduction to Object - Oriented Programming - Classes and Objects - Constructors and methods - Encapsulation and access modifiers (public, private, protected) - Hands-on exercises: Create classes and objects, define methods	**6**
IV	**Inheritance and Polymorphism:** Inheritance: extending classes - Method overriding - Polymorphism: runtime and compile time - Abstract classes and interfaces - Hands-on exercises: Implement Inheritance and Polymorphism in Java programs	**6**
V	**Exception Handling and File I/O:** Handling exceptions: try, catch, finally - Checked vs unchecked exceptions - File handling in Java: Reading from and writing to files - Hands-on exercises: Write programs to handle exceptions and work with files.	**6**
	Total	**30**

Self-study	Abstract classes and interfaces.

Textbooks:
1. Herbert Schildt, 2017. *Java: The Complete Reference*, 10th Edition, McGraw Hill Education.
2. Harvey M. Dietel, 2007. *Java How to Program*, 7th Edition, Prentice Hall.

Reference Books
1. Elisabeth Freeman, 2004. *Head First Design Patterns*, 1st Edition, O′Reilly.
2. Kathy Sierra, Bert Bates, 2005. *Head First Java*, 2nd Edition, O'Reilly Media.
3. Joshua Bloch**,** 2017. *Effective Java***,** 3rd Edition, Addison-Wesley.
4. Herbert Schildt**,** 2018. *Java: The Complete Reference*, 11th Edition**,** McGraw-Hill Education.
5. Kathy Sierra and Bert Bates**,** 2005. *Head First Java,* 2nd Edition, O'Reilly Media

Web Resources:
1. https://www.javatpoint.com/java-tutorial
2. https://www.w3schools.com/java/
3. https://www.tutorialspoint.com/java/index.htm
4. https://www.geeksforgeeks.org/java/
5. https://www.tutorialspoint.com/java/index.htm
6. https://www.codecademy.com/catalog/language/java

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I
SPECIFIC VALUE-ADDED COURSE I: SYSTEM SOFTWARE AND OPERATING SYSTEMS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
IU241V03	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
Basic computer science knowledge, in a programming language, understanding of computer architecture, familiarity with mathematical foundations, and experience with command line interfaces.

Learning Objectives:
1. To demonstrate a comprehensive understanding of system software principles, and analyze, design, and develop software systems effectively.
2. To know about operating system fundamentals distributed operating systems principles, and to design, manage, and troubleshoot complex computing environments proficiently.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	recall the fundamental principles of system software and define the CPU scheduling algorithms.	**K1**
2.	demonstrate role and functioning of compilers, interpreters, loaders, and linkers in the translation of high-level code to machine code and management of program execution.	**K2**
3.	explain the concepts of deadlock characterization and the various methods for handling deadlocks in operating systems.	**K2**
4.	apply their knowledge of memory management techniques, to solve memory allocation problems, and to design and implement basic operating system functionalities.	**K3**
5.	analyze the performance implications of different CPU scheduling algorithms and assess their impact on system performance and user experience.	**K4**

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

Units	Contents	No. of Hours
I	**System Software:** Machine - Assembly and High-Level Languages; Compilers and Interpreters; Loading - Linking and Relocation; Macros - Debuggers. **Basics of Operating Systems:** Operating System Structure - Operations and Services; System Calls - Operating System Design and Implementation; System Boot.	**6**
II	**CPU Scheduling:** Scheduling Criteria and Algorithms; Thread Scheduling - Multiple-Processor Scheduling - Real-Time CPU Scheduling. **Deadlocks:** Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Avoidance and Detection; Recovery.	**6**
III	**Memory Management:** Contiguous Memory Allocation - Swapping - Paging - Segmentation - Demand Paging - Page Replacement - Allocation of Frames - Thrashing - Memory-Mapped Files.	**6**
IV	**Security:** Protection - Access Matrix - Access Control - Revocation of Access Rights - Program Threats - System and Network Threats;	**6**

	Cryptography as a Security Tool - User Authentication - Implementing Security Defences.	
V	**Windows Operating Systems:** Design Principles - System Components - Terminal Services and Fast User Switching; File System - Networking. **Distributed Systems:** Types of Networks based Operating Systems - Network Structure - Communication Structure and Protocols; Distributed File Systems.	**6**
	Total	**30**

Self-study	Types of Networks based Operating Systems.

Textbooks:
1. Leland L. Beck and Daryl D. Manjikian, 1997. *System Software: An Introduction to Systems Programming*, 3rd Edition, Addison Wesley.
2. William Stallings, 2018. *Operating Systems: Internals and Design Principles*, 9th Edition, Pearson.

Reference Books
1. Andrew S. Tanenbaum and Herbert Bos, 2014. *Modern Operating Systems*, 4th Edition, Pearson.
2. Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, 2018. *Operating System Concepts*, 10th Edition, John Wiley & Sons.
3. Richard Anthony, 1996. *Systems Programming: Designing and Developing Distributed Applications*, 1st Edition, Pearson.
4. Johnson M. Hart, 2010. *Windows System Programming*, 4th Edition, Addison-Wesley.
5. Pavel Yosifovich, Mark E. Russinovich, David A. Solomon, and Alex Ionescu, 2017. *Windows Internals, Part 1: System architecture, processes, threads, memory management, and more*, 7th Edition, Microsoft Press.

Web Resources:
1. https://www.simplilearn.com/tutorials/programming-tutorial/what-is-system-software
2. https://www.quora.com/How-can-I-learn-subject-System-software-on-my-own
3. https://learn.microsoft.com/en-us/windows/win32/
4. https://pages.cs.wisc.edu/~remzi/OSTEP/
5. https://learn.microsoft.com/en-us/windows/apps/

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER II
CORE COURSE II: PYTHON PROGRAMMING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU242CC1	4	1	-	-	5	5	75	25	75	100

Pre-requisite:

Basic Knowledge of Programming concept.

Learning Objectives:

1. To understand and identify, important libraries in Python, and explain best practices and idiomatic expressions for writing clean and efficient Python code.
2. To develop proficiency in core Python scripting elements and build applications.

Course Outcomes

On the successful completion of the course, students will be able to:	
1.	remember fundamental python syntax and basic data types, and understand the concepts.	**K1&K2**
2.	analyze and apply functions, control statements, strings, lists and dictionaries in python programming	**K3&K4**
3.	demonstrate the concept of object, class inheritance and polymorphism in Python.	**K2**
4.	apply user defined functions and classes in python.	**K3**
5.	develop programming skills to solve real time computational problems	**K3**

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

Units	Contents	No. of Hours
I	**Python, Data Types, Expressions:** Python Programming - Running Code in the Interactive Shell - Input - Processing and Output - Editing - Saving and Running a Script - Data Types - String Literals - Escape Sequences - String Concatenation - Variables and the Assignment Statement - Numeric Data Types and Character Sets - Integers and Long Integers - Floating-Point Numbers and Character Sets - Expressions - Arithmetic Expressions and Mixed-Mode Arithmetic and Type Conversions.	15
II	**Functions, Modules and Control Statements:** Functions and Modules - Calling Functions - The math Module - The Main Module - Program Format and Structure and Running a Script from a Terminal Command Prompt - Iteration - for loop - Selection - Boolean Type - Comparisons - and Boolean Expressions - if-else Statements - One-Way Selection Statements - Multi-way if Statements - Logical Operators and Compound Boolean Expressions - Short-Circuit Evaluation and Testing Selection Statements - Conditional Iteration - while loop.	15
III	**Strings and Text Files:** Strings - Accessing Characters and Substrings in Strings - Strings and String Methods - Text Files - Text Files and Their Format - Writing Text to a File - Writing Numbers to a File - Reading Text from a File - Reading Numbers from a File and Accessing and Manipulating Files and Directories on Disk.	15
IV	**Lists and Dictionaries:** Lists - List Literals and Basic Operators - Replacing an Element in a List - List Methods for Inserting and Removing Elements - Searching and Sorting a List - Mutator Methods and the Value	15

	None - Aliasing and Side Effects - Equality and Tuples - Defining Simple Functions - Parameters and Arguments - return Statement - Boolean Functions and main function - Dictionaries: Dictionary Literals - Adding Keys and Replacing Values - Accessing Values - Removing Keys and Traversing a Dictionary.	

V	**Design with Functions and Design with Classes:** Design with Functions and Design with Classes - Functions as Abstraction Mechanisms - Problem Solving with Top-Down Design - Design with Recursive Functions and Managing a Program's Namespace – Design with classes: Objects and Classes - Data Modeling and Structuring Classes with Inheritance and Polymorphism.	**15**
	Total	**75**

Self-study	Logical Operators and Compound Boolean Expressions, Defining Simple Functions.

Textbooks:
1. Kenneth A. Lambert, Martin Osborne, 2010. Fundamentals of Python: From First Programs Through Data Structures, Course Technology, 1st Edition, Cengage Learning.
2. Paul Barry, 2016. Head First Python 2e, 2nd Revised edition, O'Reilly.

Reference Books:
1. Zed A. Shaw, 2014. *Learn Python the Hard Way*, 3rd Edition, Addison-Wesley.
2. Dave Kuhlman, 2013. *A Python Book: Beginning Python, Advanced Python, and Python Exercises*, 1st Edition, Self-Published.
3. Kent D Lee, 2011. *Python Programming Fundamentals*, 1st Edition, Springer-Verlag London Limited.
4. Reema Thareja, 2017. *Python Programming using problem solving approach*, 1st Edition, Oxford University Press.
5. Nageswara Rao R., 2017. *Core Python Programming*, 1st Edition, Dream tech Publishers.

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	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER II
CORE LAB COURSE II: PYTHON PROGRAMMING LAB

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU242CP1	-	1	4	-	**5**	**5**	**75**	**25**	**75**	**100**

Pre-requisite:
Basic computer operation skills.
Learning Objectives:
1. To understand the basics of python programming concepts.
2. To understand the high-performance programs designed to build up the real proficiency.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	remember fundamental python syntax and basic data types, and describe the concepts.	**K1&K2**
2.	analyze and apply functions, control statements, strings, lists and dictionaries in python programming	**K3&K4**
3.	demonstrate the concept of object, class inheritance and polymorphism in Python.	**K2**
4.	apply user defined functions and classes in python.	**K3**
5.	develop programming skills to solve real time computational problems	**K3**

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

List of Exercises	No. of Hours
Implement the following exercises using Python Programming language: 1. Program using Control Statements. 2. Program using Operators. 3. Program using Lists and List comprehensions. 4. Program using Set. 5. Program using Dictionary. 6. Program using Function. 7. Program using String. 8. Program using File. 9. Program using Polymorphism. 10. Program using Inheritance.	**75**

Textbooks:
1. Kenneth A. Lambert, Martin Osborne, 2010. *Fundamentals of Python: From First Program Through Data Structures*, *Course Technology*, 1st Edition, Cengage Learning,
2. Paul Barry, 2016. *Head First Python 2e*, 2nd Revised edition, O'Reilly.
Reference Books:
1. Zed A. Shaw, 2014. *Learn Python the Hard Way*, 3rd Edition, Addison-Wesley.
2. Dave Kuhlman, 2013. *A Python Book: Beginning Python, Advanced Python, and Python Exercises*, 1st Edition, Self-Published.
3. Kent D Lee, 2011. *Python Programming Fundamentals*, 1st Edition, Springer-Verlag London Limited
4. Reema Thareja, 2017. *Python Programming using Problem Solving Approach*, 1st Edition, Oxford University Press.
5. Nageswara Rao R., 2017.*Core Python Programming*, 1st Edition, Dream Tech Publishers.
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	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

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
IU242EC1	3	1	-	-	3	4	60	25	75	100

Pre-requisite:
Knowledge of basic concepts of Set Theory
Learning Objectives:
1. To impart the knowledge of fundamental concepts in probability to solve problems.
2. To understand graph algorithms and representations to solve real-world AI problems.

Course Outcomes

On the successful completion of the course, student will be able to:		
1.	gain a deep understanding of functions and their role in problem solving.	K1 & K2
2.	understand the basic principles of counting, including the product, sum rules, and apply combinatorial techniques to solve problems in various contexts.	K2 & K3
3.	acquire knowledge of the theory of probability and multiplication law of probability.	K1 & K2
4.	apply the concept of Baye's theorem and compute mathematical expectation.	K2 & K3
5.	design and implement graph-based solutions to AI problems using appropriate data structures and algorithms.	K2 & K3

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

Units	Contents	No. of Hours
I	**Functions:** Introduction- Types of Functions- Classification of Functions- Algebraic Function- Transcendental Function- Composition of Functions – Identity Function- Inverse of a Function. **Chapter 5:** Section 5.1-5.8 (Pages 5.1-5.14)	12
II	**Combinatorics:** Introduction- The Basics of Counting Principles-Product Rule- The Sum Rule- Permutations- Combination-Permutations with Repetition- Circular Permutation. **Chapter 7:** Section 7.1-7.4, 7.7-7.10 (Pages 7.1-7.3, 7.7-7.14)	12
III	**Discrete Probability:** Introduction - Sample Space - Event - Exhaustive Event - Favourable Event - Mutually Exclusive Events - Equally Likely Events - Probability - Axioms of Probability - Conditional Property -Multiplication Law of Probability - Multiplication Law of Probability for Independent Events - Extension of Multiplication Law of Probability. **Chapter 9: Sections: 9.1-9.10, 9.12-9.15**	12
IV	**Discrete Probability:** Total Probability - Baye's Theorem - Mathematical Expectations. **Chapter 9: Sections: 9.16-9.18**	12
V	**Graph Theory:** Introduction – Graph – Undirected Graph – Directed Graph – Multi Graph – Pseudo Graph – Simple Graph – General Graph – Degree of a Vertex – Finite	12

Graph – Order of a Graph – Size of a Graph – Null Graph – Isolated Graph – Regular Graph – Isomorphic Graphs –Matrix Representation of Graphs – Adjacency Matrices – Incidence Matrix – Subgraph - Weighted Graph. **Chapter 11:** Sections: **11.1- 11.3.3, 11.3.10**	
Total	**60**

Self study	Sample Space ; Unit V: Simple Graph, General Graph

Textbooks
1. 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.
3. Kenneth Bogart and Robert L Drysdale, 2014. *Discrete Mathematics for Computer Science* (3rd Edition), Addison-Wesley.
4. Kenneth H. Rosen, 2011. *Discrete Mathematics and its Applications* (7th Edition), McGraw Hill.
5. Kenneth H. Rosen, 2022. *Discrete Mathematics and its Applications*, (8th Edition), McGraw Hill.
6. S.K.Chakraborty and B.K.Sarkar, 2011. Discrete Mathematics (1st Edition), Oxford University.

Web Resources
1. https://www.slideshare.net/asadfaraz4/intro-to-discrete-mathematics
2. https://onlinecourses.nptel.ac.in/noc23_cs109/preview
3. https://www.youtube.com/watch?v=amaH38_mXK4
4. https://brilliant.org/wiki/discrete-mathematics/
5. https://discrete.openmathbooks.org/dmoi3.html

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: UNDERSTANDING INTERNET

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
IU242NM1	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
Basic computer literacy, knowledge of networks and protocols.

Learning Objectives:
1. To understand and gain knowledge of internet mass medium.
2. To study the various features of internet technology, demographic and psychographic description of internet audiences, issues related to cybercrime and cyber security.

Course Outcomes

On the successful completion of the course, students will be able to:	
1.	understand the basic concept of network and HTML.	K1 & K2
2.	understand the basics of WWW and web browsers.	K2 & K3
3.	describe the security hash function and concepts of security methods.	K2 & K3
4.	solve problems involving malware.	K3 & K4
5.	apply algorithm for secure network.	K2 & K3

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse

Units	Contents	No. of Hours
I	**Introduction to Internet:** Working and history of the internet- Uses of the internet - World Wide Web (WWW)- Web Client- Web Browser- Webpage – Website - Search Engine- Difference between network and internet- Advantages and Disadvantages of the Internet. Application Software and Programming Languages – Application Software - Packaged Software Products (Off-the-Shelf Products).	6
II	**WWW and Web Browsers:** WWW-Evolution of Web-Basic Elements of WWW-Web Browsers- Search Engines- Search Criteria. Web Publishing: Web Publishing- Web Page Design. Email: E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses-Structure of an E-Mail Message-E-Mail Clients & Servers- Mailing List-E-Mail Security.	6
III	**Digital Transformation:** Data (High Value Commodity) -Digital Transformation in Business - Features of Digital Transformation - Banking and Financial Services Industry (BFSI) - Human Resource Management – Healthcare - Big Data Analytics in Healthcare - Virtual Reality Wearable medical devices.	6
IV	**Cyber Security:** IT Assets - Risk and Vulnerabilities - Computer Security Types - Fundamental Principles of Security - Physical Safety and Security - Access Control - Biometric Access Control - Network Security - AAA Server -– Firewall – Malware – Spyware – Adware – Spamware – Virus – Ransomware – Worms - Trojan Horse	6
V	**Computer Virus:** Types of Computer Viruses - Antivirus Protection - Digital Signature - Cyber Crime – Hacking – Phishing - Spam e-mails - Attack using Malware - ATM Skimming – Ransom ware - Fake News - Deep fake – Cyber bullying.	6
	Total	30

Self-study	Advantages and Disadvantages of the Internet

Textbooks:
1. C. Xavier, 2021. *Fundamentals of Internet and Emerging Technologies*, New Age International Publishers Ltd., New Delhi., Chapters 1, 2, 3 and 9 to 16 only.
2. Pradeep K. Sinha, Priti Sinha, 2021. *Computer Fundamentals: Concepts, Systems & Applications*, 8th Edition. BPB Publications.

Reference Books
1. Teach U Comp Inc., 2014. *Mastering HTML5 and CSS3 Made Easy.*
2. Thomas Michaud, 2013. *Foundations of Web Design: Introduction to HTML & CSS*, New Riders publishers.
3. Randal Bryant, David O'Hallaron, 2015. *Computer Systems: A Programmer's Perspective*, Pearson Education.
4. EC-Council, 2009. *Computer Forensics: Investigating Data and Image Files*, 1st Edition, Cengage Learning.
5. Douglas E. Comer, 2018. *The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works*, 5th edition, Taylor and Francis.

Web Resources:
1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2. https://www.w3schools.com/html/default.asp
3. https://www.geeksforgeeks.org/introduction-to-internet/
4. https://www.geeksforgeeks.org/computer-fundamentals-tutorial/
5. https://archive.org/details/computerforensic

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	3	3	3	3	3	2	2
CO2	3	3	2	2	2	2	2	3	3	2	2	2
CO3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	3	3	2	2	3	3	3	3	3	2	2
CO5	3	3	3	2	2	3	3	3	3	3	3	2
TOTAL	15	15	13	10	10	13	13	14	15	14	12	10
AVERAGE	3	3	2.6	2	2	2.6	2.6	2.8	3	3	2.4	2

3 – Strong, 2- Medium, 1- Low

SEMESTER II
SKILL ENHANCEMENT COURSE I SEC 1: QUANTITATIVE APTITUDE

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
IU242SEC1	1	1	-	-	2	2	30	25	75	100

Pre-requisite:
Basic proficiency in mathematics and logical thinking.

Learning Objectives:
1. To develop skill to meet the competitive examinations for better job opportunity.
2. To enrich their knowledge and to develop their logical reasoning thinking ability.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	understand the basic concepts of numbers.	K1&K2
2.	apply the concept of percentage, profit and loss.	K3
3.	solve problems using distance and time.	K3
4.	analyze the concepts of discount and probability.	K4
5.	solve the problems easily with short cut methods.	K3

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

Units	Contents	No. of Hours
I	Numbers -HCF and LCM of numbers-Decimal fractions - Simplification-Square roots and cube roots - Average-Problems on Numbers. Problems on Divisibility Rules - Finding Units Digit for a Complex Calculation - Finding Reminders - Problems on Prime Factorization and Decimal Fractions	6
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion-partnership-Problems on unitary methods Problems on alternate days and wages - Problems on chain-rule.	6
III	Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Area-Volume and surface area -Problems on circular tracks, races and games.	6
IV	Permutation and combination-probability-True Discount-Bankers Discount-Height and Distances-Odd man out & Series-Problems on linear arrangement - Problems on circular arrangement -Problems when repetitions are allowed - Problems on selections.	6
V	Calendar - Clocks - Problems on stocks and shares - Data representation - Tabulation – Data Interpretation- Bar Graphs-Pie Charts-Line graphs.	6
	Total	30

Self-study	HCF and LCM of numbers, simple interest

Textbooks:
1. Aggarwal R. S., 2016. *Quantitative Aptitude (Fully solved),* Reprint, S. Chand & Company Ltd.

Reference Books
1. Praveen R.V., 2013. Quantitative Aptitude and Reasoning, 2nd Revised Edition, Prentice-Hall of India Pvt. Ltd.
2. Ranganath G. K., Sampangiram C. S. and Rajaram Y., 2008. A text Book of business Mathematics, Himalaya Publishing House.
3. Abhijit Guha, 2019. Quantitative Aptitude for Competitive Examinations, 7th Edition, McGraw Hill.

Web Resources:
1. https://www.indiabix.com/aptitude/problems-on-trains/
2. https://www.javatpoint.com/aptitude/quantitative
3. https://www.careerride.com/problems-on-percentage.aspx
4. https://testbook.com/objective-questions/mcq/
5. https://talentbattle.in/practice-quantitative-aptitude-questions/

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	2	1	2	3	2	2.5	2	1
CO2	3	2	1	2	2	1	2	3	2	2.5	2	1
CO3	3	2	1	2	2	1	2	3	2	2.5	2	1
CO4	3	2	1	2	2	1	2	3	2	2.5	2	1
CO5	3	2	1	2	2	1	2	3	2	2.5	2	1
TOTAL	15	10	5	10	10	5	10	15	10	12.5	10	5
AVERAGE	3	2	1	2	2	1	2	3	2	2.5	2	1

3 – Strong, 2- Medium, 1- Low

SEMESTER I & II
LIFE SKILL TRAINING I: CATECHISM

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
UG242LC1	1	-	-	-	1	1	15	50	50	100

Objectives:
1. To develop human values through value education
2. To understand the significance of humane and values to lead a moral life

On the successful completion of the course, students will be able to:		
1	understand the aim and significance of value education	K1,K2
2	develop individual skills and act confidently in the society	K3
3	learn how to live lovingly through family values	K3
4	enhance spiritual values through strong faith in God	K6
5	learn good behaviours through social values	K6

K1 - Remember **K2**-Understand; **K3**-Apply; **K6**- Create

Units	Contents	No. of Hours
I	**Value Education:** Human Values – Types of Values – Growth – Components – Need and Importance - Bible Reference: Matthew: 5:3-16	3
II	**Individual Values: Esther** Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life - Bible Reference: Esther 8:3-6	3
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	3
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	3
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	3
	Total	15

Textbooks

Humane and Values. Holy Cross College (Autonomous), Nagercoil
The Holy Bible

SEMESTER I & II
LIFE SKILL TRAINING I: MORAL

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	CIA	External	Total
								Marks		
UG242LM1	1	-	-	-	1	1	15	50	50	100

Objectives:
1. To develop human values through value education
2. To understand the significance of humane and values to lead a moral life

Course Outcomes

On the successful completion of the course, students will be able to:		
1	understand the aim and significance of value education	K1,K2
2	develop individual skills and act confidently in the society	K3
3	learn how to live lovingly through family values	K3
4	enhance spiritual values through strong faith in God	K6
5	learn good behaviours through social values	K6

K1 - Remember **K2**-Understand; **K3**-Apply; **K6**- Create

Units	Contents	No. of Hours
I	**Value Education:** Introduction – Limitations – Human Values – Types of Values – Aim of Value Education – Growth – Components – Need and Importance	3
II	**Individual Values:** Individual Assessment – Vanishing Humanity – Components of Humanity – Crisis – Balanced Emotion – Values of Life.	3
III	**Family Values:** Life Assessment – Respecting Parents – Loving Everyone – Confession – True Love.	3
IV	**Spiritual Values:** Faith in God – Wisdom – Spiritual Discipline – Fear in God – Spiritually Good Deeds.	3

V	**Social Values:**
	        Good Behaviour – Devotion to Teachers – Save Nature – Positive Thoughts – Drug Free Path – The Role of Youth in Social Welfare.
	Cultural Values:
	        Traditional Culture – Changing Culture – Food – Dress – Habit – Relationship – Media – The Role of Youth.
		3

	Total	15

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