P.K.R. ARTS COLLEGE FOR WOMEN

(Re-Accredited with 'A' grade by NAAC)

Autonomous Institution- Affiliated to Bharathiar University, Coimbatore

No.127, Pariyur Road, GOBICHETTIPALAYAM – 638 476.

Department of Computer Science

Bachelor of Science in Artificial Intelligence & Machine Learning

SCHOLASTIC COURSES

AND

CO-SCHOLASTIC COURSES

For the candidates admitted from the Academic Year 2024-2025 and onwards

Under CBCS PATTERN

P.K.R ARTS COLLEGE FOR WOMEN

(Autonomous Institution, Re-Accredited by NAAC with 'A' Grade)
Gobichettipalayam-638476

BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING-PROGRAMME STRUCTURE

CBCS Pattern: 2024-2025

Scholastic Courses:

Category	Component	No. of Courses	Credit(s)/ Course	Total Credits	Proposed Semester
Part – I	Tamil/Hindi/French/Kannada/Malayalam/ Sanskrit	4	3	12	I – IV
Part – II	English	4	3	12	I – IV
Part - III	**Core Courses** *(Core Theory /Core Practical/ Core Allied/ Elective/Open Elective)*	24	2/3/4/5	94	I - VI
	Institutional Training/ Industrial Training/ Mini Project	1	1	1	V
Part –IV	**A. Foundation Courses:** i. Environmental Studies ii. Yoga and Ethics	 1 1	 2 2	4	 I II
	B. Ability Enhancement Courses: i. Information Security ii. Consumer Rights	 1 1	 2 2	4	III IV
	C. Skill Enhancement Courses: i. Internet of Things - Practical ii. Web Programming - Practical iii. Google Colab -Practical	1 1 1	2 2 2	6	IV V VI
	D. Non-Major Elective: i. Indian Women and Society / Advanced Tamil	1	2	2	III
Part –V	**A. Proficiency Enhancement** i. Ethical Hacking (Self Study) **B. Competency Enhancement:** i. NSS/YRC/RRC/CCC/PHY.EDU/ OTHERS ii. Professional Grooming iii. Students Social Activity	1 1 1 1	2 1 1 1	5	V I to VI I to VI I to VI

Total Marks: 3800 Total Credits: 140

P.K.R ARTS COLLEGE FOR WOMEN

(Autonomous Institution, Re-Accredited by NAAC with 'A' Grade)
Gobichettipalayam-638476
BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
Programme Scheme and Scheme of Examinations
(For students admitted from 2024-2025 & onwards)

Scholastic Courses:

Category	Component	Course Code	Course Title	Contact Hrs/ week	Exam Duration hrs.	Max Marks			Credits
						CIA	ESE	Total	
SEMESTER - I									
Part I	Language : I	24LTU01/ 24LHU01/ 24LFU01/ 24LKU01/ 24LMU01/ 24LSU01	Tamil - I/ Hindi - I/ French - I/ Kannada - I/ Malayalam - I/ Sanskrit-I	4	3	25	75	100	3
Part II	English: I	24LEU01	English - I	4	3	25	75	100	3
Part III	Core : I	24AMU01	Programming in C++	5	3	25	75	100	4
Part III	Core : II Practical: I	24AMU02	Programming in C++ - Practical	5	3	40	60	100	4
Part III	Core : III	24AMU03	Data Structures	5	3	25	75	100	4
Part III	Core : IV Allied : I	24AMU04	Discrete Mathematics	5	3	25	75	100	3
Part IV	Foundation : I	24FCU01	Environmental studies	2	3	50	--	50	2
			TOTAL	**30**				**650**	**23**
SEMESTER - II									
Part I	Language : II	24LTU02/ 24LHU02/ 24LFU02/ 24LKU02/ 24LMU02/ 24LSU02	Tamil- II/ Hindi-II/ French II/ Kannada-II/ Malayalam-II/ Sanskrit-II	4	3	25	75	100	3
Part II	English : II	24LEU02	English: II	4	3	25	75	100	3
Part III	Core : V	24AMU05	Programming in Java	6	3	25	75	100	4
Part III	Core : VI Practical: II	24AMU06	Programming in Java - Practical	5	3	40	60	100	4
Part III	Core : VII Practical: III	24AMU07	Internet Basics - Practical	3	3	40	60	100	2
Part III	Core : VIII Allied : II	24AMU08	Applied Mathematics	6	3	25	75	100	3
Part IV	Foundation : II	24FCU02	Yoga and Ethics	2	3	50	--	50	2
			TOTAL	**30**				**650**	**21**

SEMESTER - III									
Part I	Language : III	24LTU03/ 24LHU03/ 24LFU03/ 24LKU03/ 24LMU03/ 24LSU03	Tamil- III/ Hindi-III/ French-III/ Kannada-III/ Malayalam-III/ Sanskrit-III	4	3	25	75	100	3
Part II	English : III	24LEU03	English: III	4	3	25	75	100	3
Part III	Core : IX	24AMU09	Programming in Python	6	3	25	75	100	5
Part III	Core : X Practical: IV	24AMU10	Programming in Python – Practical	6	3	40	60	100	4
Part III	Core : XI Allied : III	24AMU11	Artificial Intelligence & Knowledge Representation	6	3	25	75	100	3
Part IV	Ability Enhancement : I	24AEU01	Information Security	2	3	50	-	50	2
Part IV	Non- Major Elective	24NMU01A/ 24NMU01B	Indian Women and Society/ Advanced Tamil	2	3	50	-	50	2
			TOTAL	**30**				**600**	**22**
SEMESTER – IV									
Part I	Language : IV	24LTU04/ 24LHU04/ 24LFU04/ 24LKU04/ 24LMU04/ 24LSU04	Tamil- IV/ Hindi-IV/ French-IV/ Kannada-IV/ Malayalam-IV/ Sanskrit-IV	4	3	25	75	100	3
Part II	English : IV	24LEU04	English: IV	4	3	25	75	100	3
Part III	Core : XII	24AMU12	Programming in R	6	3	25	75	100	5
Part III	Core : XIII Practical: V	24AMU13	Programming in R - Practical	5	3	40	60	100	4
Part III	Core : XIV Allied : IV	24AMU14	Internet of Things	6	3	25	75	100	5
Part IV	Skill Enhancement : I	24SEAMU01	Internet of Things – Practical	3	3	50	-	50	2
Part IV	Ability Enhancement : II	24AEU02	Consumer Rights	2	3	50	-	50	2
			TOTAL	**30**				**600**	**24**

	SEMESTER – V								
Part III	Core : XV	24AMU15	Machine Learning Techniques	6	3	25	75	100	4
Part III	Core : XVI Practical :VI	24AMU16	Machine Learning-Practical	6	3	40	60	100	4
Part III	Core : XVII	24AMU17	Data Mining and Warehousing	6	3	25	75	100	4
Part III	Core : XVIII	24AMU18A/ 24AMU18B/ 24AMU18C	Institutional Training/ Industrial Training/ Mini Project	-	3	100	-	100	1
Part III	Core : XIX (Open Elective)	***	Opted by the students offered by other departments	4	3	25	75	100	2
Part III	Core : XX Elective : I	24AMU19A 24AMU19B/ 24AMU19C/ 24AMU19D	Deep Learning – Level 1 / Data Science – Level 1 / Software Agents/ Business Data Analytics	5	3	25	75	100	4
Part IV	Skill Enhancement : II	24SEAMU02	Web Programming - Practical	3	3	50	-	50	2
Part V	Proficiency Enhancement	24PEAMU01	Ethical Hacking (Self Study)	--	3	--	100	100	2
			TOTAL	**30**				**750**	**23**
SEMESTER - VI									
Part III	Core : XXI	24AMU20	Natural Language Processing	6	3	25	75	100	5
Part III	Core : XXII Practical: VII	24AMU21	Natural Language Processing-Practical	5	3	40	60	100	4
Part III	Core : XXIII	24AMU22	Robotics and its Applications	6	3	25	75	100	5
Part III	Core : XXIV Elective : II	24AMU23A/ 24AMU23B/ 24AMU23C/ 24AMU23D	Deep Learning –Level 2/ Data Science – Level 2/ Web Application Security/ Artificial Neural Networks and Fuzzy Systems	5	3	25	75	100	4

Part III	Core : XXV Elective : III	24AMU24A/ 24AMU24B/ 24AMU24C/ 24AMU24D	Big Data Analytics / Open Source Software/ Embedded System/ Principles of Secure Coding	5	3	25	75	100	4
Part IV	Skill Enhancement: III	24SEAMU03	Google Colab - Practical	3	3	50	-	50	2
			TOTAL	**30**				**550**	**24**
Part V	Competency Enhancement		NSS/YRC/RRC/CCC /PHY.EDU/ Others		SEMESTER I – VI				1
			Professional Grooming (Life Skills – Jeevan Kaushal)		SEMESTER I – VI				1
			Students Social activity (Related to the Curriculum)		SEMESTER I –VI				1

NOTE: CREDIT TRANSFERABILITY FOR ALL COURSES FROM UGC REFERRED SWAYAM AND MOOC COURSES.

Total Marks: 3800 **Total credits: 140**

Chair Person

Name, designation

SYLLABUS

முதற்பருவம்

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART : I	LANGUAGE : I	24LTU01	**Tamil –I**	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External marks	Total Marks
I	**I**	**25**	**75**	**100**

முகப்புரை:

தமிழ்மொழி குறித்த அடிப்படை அறிவினையும் வகைமையினையும் அறிதல்.

COURSE OUTCOME:

பொதுத்தமிழைப் படிப்பதன் வாயிலாக கீழ்க்கண்ட திறன்களைப் பெறுவர்.

COs	CO Statement	Knowledge Level
CO1	தமிழ் இலக்கிய வகைமைகளைக் கற்றல்	K1
CO2	மொழியை பிழையில்லாமல் எழுதவும் பேசவும் கற்றல்	K2
CO3	பெண்ணியம் சார்ந்த சிந்தனைகளை வளர்த்தல்	K3
CO4	புதுக்கவிதை, சிறுகதை உத்திகளை திறனாய்தல்	K4
CO5	படைப்பாளர்களாக உருவாக்கம் பெறுதல்	K5

K1: Remember Level , K2:Understand Level , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	3	9	3	3	9	9
CO2	9	9	9	9	3	3	3
CO3	9	3	9	9	9	3	3
CO4	9	3	9	9	3	3	3
CO5	9	9	9	3	9	9	3
Total contribution of COs to POs	45	27	45	33	27	27	21
Weighted Percentage of COs contribution to POs	2.29	1.71	2.84	2.10	2.24	2.22	1.94

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

அலகு 1 இயற்கை *8 மணி நேரம்*

காலைப்பொழுது, அந்திப்பொழுது, மழை – பாரதியார்
ஆறு – பாரதிதாசன்
இயற்கை வாழ்வு –கவிமணி
நெய்தல் நீர் - சுரதா
மரங்கள் - மு.மேத்தா

அலகு 2 பெண்ணியம் *10 மணி நேரம்*

நவீன தாலாட்டு - வைரமுத்து
பெண்ணுரிமை பேணுநர் - பொன்மணி வைரமுத்து
அம்மா - இளம்பிறை

அலகு 3 சிறுகதைகள் - சமுதாயம் 10 *மணி நேரம்*

கன்னி – இந்திரா பார்த்தசாரதி
அம்மாவுக்கு ஓய்வு – ஜோதர்லதா கிரிஜா
கழிவு– ஆண்டாள் பிரியதர்சினி
பூக்களும் விற்பனைக்கே – திலகவதி

அலகு 4 இலக்கணம் **10** *மணி நேரம்*

வல்லினம் மிகும் இடங்கள்
வல்லினம் மிகா இடங்கள்
ந ண ன, ல ள ழ, ர ற வேறுபாடு
மரபுச் சொற்கள்

அலகு 5 இலக்கிய வரலாறு **10** *மணி நேரம்*

புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
சிறுகதையின் தோற்றமும் வளர்ச்சியும்
படிமம் - குறியீடு பற்றிய விளக்கங்கள்

பயிற்சிக்குரியன - கடிதம் வரைதல், விண்ணப்பம் எழுதுதல்

பாடநூல்கள் :

1. மகாகவி பாரதியார் கவிதைகள், ஸ்ரீ செண்பகா பதிப்பகம், கிருஷ்ணா தெரு, தியாகராயநகர், சென்னை-600 017. எட்டாம் பதிப்பு: 2005.
2. உவமைக்கவிஞர் சுரதா கவிதைகள்(முதற்தொகுதி), வள்ளுவர் தமிழ்ப்பீடம், 56-அ, டாக்டர் லட்சுமணசாமி சாலை, கலைஞர் கருணாநிதி நகர், சென்னை-600 078 முதற்பதிப்பு: பிப்ரவரி 2007.
3. மு.மேத்தா கவிதைகள் (தேர்ந்தெடுத்த கவிதைகள்) கவிதா பப்ளிகேஷன், 8,மாசிலாமணி தெரு, பாண்டிபஜார்,தி.நகர், சென்னை-600 017 இரண்டாம் பதிப்பு: ஆகஸ்ட் 2011.
4. வைரமுத்து கவிதைகள், சூர்யா லிட்ரேச்சர்(பி)லிட், 22,நான்காம் குறுக்குத்தெரு,,டிரஸ்ட் புரம், சென்னை-24 பத்தாம் பதிப்பு: ஜீலை 2009.
5. பொன்மணி வைரமுத்து கவிதைகள், சூர்யா லிட்ரேச்சர்(பி)லிட், 22,நான்காம் குறுக்குத்தெரு, டிரஸ்ட் புரம், சென்னை-24. நான்காம் பதிப்பு: 1996

பார்வை நூல் :

வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், சீதை பதிப்பகம், சென்னை 600005, 6 ஆம் பதிப்பு 2014.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART – II	ENGLISH: I	24LEU01	ENGLISH - I	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
I	**I**	**25**	**75**	**100**

PREAMBLE:

To impart basic knowledge about the English Language and various genres in Literature

COURSE OUTCOME:

On the successful completion of the course, Students will be able to

COs	CO Statement	Knowledge Level
CO1	Identify the main ideas of the different genres.	**K1**
CO2	Enhance their four skills of language learning.	**K2**
CO3	Avoid the common grammatical errors.	**K3**
CO4	Detect the correct usage of vocabulary.	**K4**
CO5	Interpret the grammatical forms of English through activities, assignments, reading the texts.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO2	**9**	**3**	**3**	**3**	**3**	**1**	**1**
CO3	**9**	**3**	**3**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**1**	**1**	**1**
CO5	**3**	**1**	**1**	**1**	**1**	**1**	**0**
Total contribution of COs to POs Weightage	**33**	**19**	**17**	**15**	**9**	**7**	**6**
Weight Percentage of COs contribution to POs	2.42	1.73	1.87	1.94	2.34	2.17	2.48

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;
9- High correlation between COs and POs.

COURSE CONTENT

UNIT I: Poetry **(7 Hours)**

1. All the world's a stage – William Shakespeare
2. On Killing a tree – Gieve Patel
3. Night of the Scorpion - Nissim Ezekiel

UNIT II: Prose **(8 Hours)**

1 Good Manners - J.C. Hill
2. Of love – Francis Bacon
3. The worship of wealthy- G.K. Chesterton

UNIT III: Short Stories **(9 Hours)**

1. The Lost Child – Mulk Raj Anand
2. Happy Prince - Oscar Wilde
3. The Lottery Ticket - Anton Chekhov

UNIT IV: One-Act Play **(10 Hours)**

1. Refund – Fritz Karinthy
2. The Never, Never nest – Cedric Mount.

UNIT V: Grammar and Composition **(14 Hours)**

1. Parts of Speech
2. Nouns
3. Pronouns
4. Verbs
5. Adjectives
6. Adverbs
7. Prepositions
8. Conjunctions and Interjections

TEXT BOOK: BLOSSOM

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE: I	24AMU01	PROGRAMMING IN C++	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
I	I	25	75	100

PREAMBLE:

To learn about Object Oriented Concepts through C++.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall the basics of OOPS	**K1**
CO2	Summarize the concepts of functions, operator overloading ,pointers ,exceptions	**K2**
CO3	Classify constructors, classes	**K3**
CO4	Analyze pointers, exceptions	**K4**
CO5	Determine operator overloading ,strings ,exceptions	**K5**

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

CO-POMAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	3	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of COs to POs	45	21	45	45	45	45	45
Weighted Percentage of COs Contribution to POs	2.49	1.54	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–Nocorrelation; 1 –Low correlation; 3 –Medium correlation;

9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I **Introduction to C++** **(12 Hours)**

Software Evolution - A Look at Procedure-Oriented Programming - Object Oriented Paradigm - Basic Concepts of OOP - Benefits of OOP - Object Oriented Languages - Applications of OOP - Beginning With C++ - Tokens - Expressions and Control Structures.

UNIT- II **Function in C++** **(12 Hours)**

Main Function - Function Prototyping - Call By Reference - Return By Reference - Inline Function - Function Overloading – Classes and Objects: C Structures Revisited - Specifying a Class - Defining Member Function - C++ Program with Class - Nesting of Member Function - Private Member Function - Memory Allocation for Objects - Static Data Members and Functions - Array of Objects - Objects as Function Arguments - Friendly Functions – Constructors and Destructors: Constructor - Parameterized Constructors - Multiple Constructor in a Class - Copy Constructor - Destructor.

UNIT- III **Operator Overloading** **(12 Hours)**

Introduction - Defining Operator Overloading - Overloading Unary Operator - Overloading Binary Operator - Overloading Binary Operator Using Friends - Rules for Overloading Operator – Inheritance: Defining Derived Classes - Single Inheritance - Making a Private Member Inheritable - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes.

UNIT- IV **Pointers** **(12 Hours)**

Introduction - Pointers - Array of Pointers - Pointers to Objects - This Pointer - Pointer to Derived Class - Virtual Functions - Rules for Virtual Function - Pure Virtual Function – Managing Console I/O Operations.

UNIT- V **Exception Handling and Strings** **(12 Hours)**

Working with Files – Exception Handling: Introduction - Basics of Exception Handling - Exception Handling Mechanism - Throwing Mechanism - Catching Mechanism – Strings: Introduction - Creating (String) Objects - Manipulating String Objects - Relational Operators - String Characteristics.

TEXTBOOK(S):

1. E. Balagurusamy, Object Oriented Programming with C++, Fifth Edition, TMH Publication.

REFERENCE BOOK(S):

1. John R Hubbard, Programming with C++, 2nd Edition, TMH Publication, 2002.
2. Maria Litvin & Gary Litvin, C++ for you, Vikas Publication, 2002.
3. Yashavant Kanetkar, Let us C++, BPB Publication, 2nd Edition, 2010.

WEB REFERENCES

1. https://youtu.be/s0g4ty29Xgg
2. https://www.w3schools.com/c/c_functions.php
3. https://www.programiz.com/cpp-programming/operator-overloading
4. https://youtu.be/zuegQmMdy8M?si=GxV0CLaMYPcynQI7
5. https://www.tutorialspoint.com/cplusplus/cpp_exceptions_handling.htm

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:II PRACTICAL:I	24AMU02	PROGRAMMING IN C++ -PRACTICAL	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
I	I	40	60	100

PREAMBLE:

To learn about Object Oriented Concepts through C++.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall the concepts of basic functions & operator	**K1**
CO2	Design program using decision making, looping & overloading	**K2**
CO3	Classify constructors, classes and inheritance	**K3**
CO4	Analyze pointers, exceptions	**K4**
CO5	Apply operator overloading, strings, exceptions	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POsCOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	3	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of COs to POs	45	21	45	45	45	45	45
Weighted Percentage of COs Contribution To POs	2.49	1.54	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation;
9-High correlation between Cos and POs.

PRACTICAL LIST

1. Write a C++ program to find a factorial for a given number using recursive function.
2. Write a C++ program to find a Fibonacci series using while loop.
3. Define a class to represent a bank account. Include the following members: Data members: Name of the depositor, Account number, Type of account, Balance amount in the account. Member functions: To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display the name and balance. Write a main program to invoke the member functions.
4. Write a C++ program to read an integer number and find the sum of all the digits until it reduces to a single digit using constructors, destructors, and inline member functions.
5. Write a C++ program to swap two numbers using friend function.
6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, and Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA, and PF depending on the grade. Create an array of objects for the derived class.
7. Write a C++ program to add two complex numbers using operator overloading concept.
8. Write a C++ Program to check whether the given string is a palindrome or not using Pointers.
9. Write a C++ Program to merge two files into a single file.
10. Write a C++ Program to implement exception handling concept using divide by zero.
11. Write a C++ program to implement the concept of class template.
12. Write a C++ Program to implement any four built-in string functions.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE: III	24AMU03	DATA STRUCTURES	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
I	I	25	75	100

PREAMBLE:

This course offers the basic understanding and knowledge of different data structures, sorting algorithms and symbol tables.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall various data structures, algorithm sand sorting methods	**K1**
CO2	Describe the basic concepts of data structures, sorting and Symbol table	**K2**
CO3	Use appropriate data structures for varied problems	**K3**
CO4	Examine different data structures and algorithms to find Best solution for the real time applications	**K4**
CO5	Recommend a specific data structure and sorting Algorithm for an application.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	3	9	9	9	9	9
CO3	9	3	9	9	3	3	9
CO4	9	3	9	9	3	3	9
CO5	9	3	9	9	3	3	9
Total Contribution of COs to POs	45	21	45	45	27	27	45
Weighted Percentage of COs Contribution To POs	2.49	1.54	2.78	2.99	2.30	2.54	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I Introduction and Elementary Data Structure (12 Hours)

Introduction - Data structure - Overview - Definition - How to create a program – Arrays - Ordered List – Sparse Matrices - Representation of Arrays - Stacks and Queues – Fundamentals - Evaluation of Expressions.

UNIT- II Linked List and Tree (12 Hours)

Linked Lists - Singly Linked List - Linked Stacks and Queues – Polynomial Addition - Doubly Linked Lists and Storage Management. Trees: Basic Terminology - Binary Trees - Binary Tree Representation - Binary Tree Traversal.

UNIT- III Graph and its applications (12 Hours)

Graphs - Introduction – Definition and Terminology - Graph Representation – Traversals - Connected components and spanning Trees - Shortest path - Transitive Closure.

UNIT- IV Internal Sorting (12 Hours)

Internal Sorting - Insertion sort – Quick sort – Merge sort – Heap sort – Sorting on Several Keys.

UNIT- V Symbol Tables (12 Hours)

Symbol Tables - Static Tree Tables - Dynamic Tree Tables - Hash Tables - Hashing Functions - Overflow Handling.

TEXTBOOK(S):

1. Ellis Horowitz, Sartaj Shani, (1994), Fundamentals of Data Structures, First Edition, Galgotia Publication.

REFERENCE BOOK(S):

1. Seymour Lipschutz, Data Structures, Tata Mc Grawhill, Year 2006.
2. D. Samanta, “Classical Data Structure”, Prentice Hall India.
3. GAV PAI, Data Structures and Algorithms Concepts, Techniques Applications, McGraw Hill Education, New Delhi.

WEB REFERENCES

1. **https://www.geeksforgeeks.org/data-structures/**
2. **https://www.javatpoint.com/data-structure-tutorial**
3. **https://www.youtube.com/watch?v=DFpWCl_49i0**
4. **https://www.geeksforgeeks.org/classification-of-sorting-algorithms/**
5. **https://www.javatpoint.com/data-structure-for-symbol-table**

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credits
PART-III	CORE:IV ALLIED : I	23AMU04	DISCRETE MATHEMATICS	60	3

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
I	I	25	75	100

PREAMBLE:

To enable the students to learn about Mathematical Logics, Relations and Functions, Combinatorics, Recurrence Relations and Lattices.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

CO's	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of logical operations, relations and functions, Combinatorics, Recurrence Relations and Lattices.	**K_1**
CO2	illustrate the properties of logical operations, relations and functions, Combinatorics, Recurrence Relations and Lattices.	**K_2**
CO3	apply the various formulae to solve the rules of tautology, rules of inference, properties of functions, Combinatorics, Recurrence Relations and Lattices.	**K_3**
CO4	examine about logical operators, relations and functions, Combinatorics, Recurrence Relations and Lattices.	**K_4**
CO5	evaluate the problems based on logical expressions, relations, functions, Combinatorics, Recurrence Relations and Lattices..	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COS-POS MAPPING (COURSE ARTICULATION MATRIX)

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	3	3	3	3	0	0	0
Total Contribution of COs to POs	39	39	33	33	10	10	10
Weighted Percentage of COs contribution to POs	2.16	2.86	2.04	2.19	0.85	0.94	0.95

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT

UNIT - I MATHEMATICAL LOGIC (15 Hours)

Propositional Calculus – Basic Logical Operations – statements generated by set – conditional statements – bi conditional statements – tautologies – contradiction – arguments – methods of proof – Equivalence and implication –Predicate Calculus – Quantifiers.

UNIT - II RELATIONS AND FUNCTIONS: (10 Hours)

Binary relations – types of relations - Partial Order relations - Equivalence Relations - Composition of Relations.

Definition and notation of a function – types of functions – invertible functions – Composition of functions - identity function.

UNIT - III COMBINATORICS (10 Hours)

Permutations – Combinations - Pigeonhole principle.

UNIT - IV RECURRENCE RELATIONS (15 Hours)

Introduction - Recurrence Relation –linear recurrence relations with constant coefficients – methods of solving with constant coefficients - non-homogeneous recurrence relations.

UNIT - V LATTICES (10 Hours)

Totally ordered set or chain - Product set and partial order relation – Hasse diagrams - Lattice– Properties of Lattices – duality – types of lattices.

TEXT BOOK:

Sharma.J.K. (Fifth Edition) – "Discrete Mathematics", University Science Press (An imprint of Laxmi Publications Pvt. Ltd.)

UNIT	CHAPTER	PAGE NO.
I	12	394 – 427
II	3 4	84 – 92, 101,102 109 – 121
III	6	155 – 166, 170-177, 179
IV	8	218 – 243
V	14	487 – 504

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	FOUNDATION: I	24FCU01	ENVIRONMENTAL STUDIES	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
I	I	50	-	50

PREAMBLE:

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioral pattern in society that is based on creating sustainable lifestyle

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Define environment, ecosystem, biodiversity, environmental Pollution and social issues.	**K1**
CO2	Explain the natural resources, types of ecosystem, geographical classification of India, causes of environmental pollution and the problems related to the society.	**K2**
CO3	Identify the information related to environment and th resources to protect it.	**K3**
CO4	Analyze the classification of natural resources, energy flow intheecosystem,threatstobiodiversity,disastermanagementandth eroleofinformationtechnologyinenvironmentandhuman	**K4**
CO5	Assess the environmental issues with a focus on sustainability.	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	1	3
CO3	9	9	9	9	1	1	3
CO4	9	9	9	9	1	1	3
CO5	9	9	3	3	1	1	3
Total Contribution of Cos to POs	45	45	39	39	9	7	15
Weighted Percentage of Cos Contribution	2.49	3.30	2.41	2.59	0.77	0.66	1.42

Level of correlation: 0–Nocorrelation; 1 –Low correlation; 3–Medium correlation; 9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I **(4 Hours)**

Environment: Definition, Components, Segments and Types. **Natural Resources:** Meaning, Components: **(1. Forest** - Meaning, Importance and Types **2. Water** - Meaning, Types and Problems **3. Mineral** - Meaning and Classification **4. Food** - Meaning and Problems **5. Energy** - Meaning, Forms and Types 6. Land - Meaning, Structure and Functions, Components), Classification: Renewable and Non-Renewable Resources, Role of an Individual in Conservation of Natural Resources.

UNIT- II **(5 Hours)**

Ecosystems – Definition, Features, Structure and Function of an Ecosystem, Producers, Consumers and Decomposers, Energy Flow in the Ecosystem (Water, Carbon, Nitrogen, Oxygen and Energy), Food Chains, Food Webs and Ecological Pyramids.

Introduction Types, Characteristics Features, Structure and Function of the following Ecosystem:

- Forest Ecosystem
- Grassland Ecosystem
- Desert Ecosystem
- Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Ocean, Estuaries)

UNIT- III **(5 Hours)**

Biodiversity and its Conservation - Introduction – Definition – Genetic, Species and Ecosystem Diversity, Bio geographical Classification of India - Value of Biodiversity – Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Value - Biodiversity at Global, National and Local Levels - India as a Mega-Diversity Nation - Hot-Spots of Biodiversity - Threats to Biodiversity – Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts - Endangered and Endemic Species of India Conservation of Biodiversity – In-situ and Ex-situ and Conservation of Biodiversity.

UNIT- IV **(5 Hours)**

Environmental Pollution: Definition, Causes, Effects, control measures and Prevention Acts for Air, Water, Soil, Noise, Thermal Pollutions and Nuclear Hazards.

Solid Waste Management: Meaning, Causes, effects and control measures of urban and industrial wastes.

Disaster Management: Meaning, Types of Disasters: flood, earthquake, cyclone and landslides. **Environmental Ethics:** Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear-accidents and holocaust. Consumerism and waste products, Public Awareness.

UNIT- V **(5 Hours)**

Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rainwater harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns.

Human Population and the Environment: Population growth and distribution - Population explosion – Family Welfare Programme - Environment and human health - HIV/AIDS - Role of Information Technology in Environment and human health - Medical transcription and bio-informatics.

REFERENCE BOOKS :

1. Agarwal, K.C. 2001. Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha, Erach. The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad.
3. Brunner, R.C., 1989. Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4. Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
5. Cunningham, W.P., Cooper, T.H., Gorhani, E., Hepworth, M.T. 2001. Environmental Encyclopedia, Jaico Public. House, Mumabai, 1196p.
6. De, A.K. Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P. 1993. Water Crisis, Pacific Institute for Studies in Dev., Environment Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
9. Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Univ. Press 1140p.
11. Jadhav, H. & Bhosale, V.M. 1995. Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
12. Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web Enhanced Edition. 639p.
13. Mhaskar, A.K., Matter Hazardous, Techno-Science Publication (TB).
14. Miller, T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rao, M.N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001. Environmental Chemistry. Geol Publ. House, Meerut.
18. Survey Of the Environment, The Hindu (M).
19. Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science (TB).

இரண்டாம் பருவம்

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART : I	LANGUAGE: II	24LTU02	Tamil - II	48	3

Contact hours per week : 4

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	25	75	100

முகப்புரை:

நீதி இலக்கியம் சார்ந்த நூல்களைப் படிப்பதன் மூலம் வாழ்வில் அற உணர்வினைப் பெறுவர்.

COURSE OUTCOME:

இதனைக் கற்பதன் மூலம் கீழ்க்காணும் நிலையை அடைவர்.

COs	CO Statement	Knowledge Level
CO1	அறஇலக்கிய வகைமைகளை அறிந்து கொள்ளுதல்.	K1
CO2	அறஇலக்கியங்கள் வழிகாட்டும் ஒழுக்கங்களைக் கற்றல்.	K2
CO3	மனித நேய மாண்புடன் விளங்குதல்.	K3
CO4	இலக்கியங்களுக்கிடையே உள்ள உறவு நிலைகளைத் தொடர்புப்படுத்துதல்.	K4
CO5	சுற்றுச்சூழல் குறித்த விழிப்புணர்வைக் கொண்டு சமூகத்தை மதிப்பிடல்.	K5

K1: Remember Level , K2:UnderstandLevel , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	3	3	9	9	9	3
CO3	9	9	9	3	9	3	3
CO4	9	9	9	9	3	3	3
CO5	9	3	9	3	3	3	3
Total contribution of COs to POs Weightage	45	33	39	33	33	27	21
Weight Percentage of COs contribution to POs	**2.29**	**2.09**	**2.46**	**2.10**	**2.74**	**2.22**	**1.94**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

அலகு - 1 அறநூல்கள் **10 மணி**

1. திருக்குறள் - அ) இன்னா செய்யாமை (1-10)
   ஆ) சொல்வன்மை (1-10)
2. நாலடியார் - அ) கல்வி (1-10)
   ஆ) நட்பாராய்தல் (1-10)
3. நன்னெறி - 10 பாடல்கள் (4,5,8,9,11,15,16,18,19,24)

அலகு - 2 தனிப்பாடல் திரட்டு **10 மணி**

1. அருணாச்சலக் கவிராயர் - 'வெண்ணெயுற்று நெய்தேட்...'
2. அவ்வையார் - 'வான்குருவியின் கூடு...'

   'சித்திரமும் கைப்பழக்கம்...'
   'சொல்லாமலே பெரியர்...'
   'கற்றது கைமண்ணளவு...'
   'எட்டேகால் லட்சணமே...'
   மதியாதார் முற்றம் மதித்து...'
3. காளமேகப் புலவர் - 'வாரிக்ககளத்து அடிக்கும்...'

அலகு - 3 உரைநடை **10 மணி**

1. கைகேயி உள்ளம் - தீப.நடராஜன்
2. வியர்வையின் வெகுமதி - வெ.இறையன்பு
3. கோ.வை. கோதைநாயகி அம்மாள் - பைம்பொழில் மீரான்
4. நண்பரின் பண்பு - தமிழண்ணல்

அலகு– 4 -இலக்கணம் **8 மணி**

சொல் வகைகள் - பெயர்ச்சொல் - இடுகுறிப்பெயர், காரணப்பெயர்

வினைச்சொல் - தெரிநிலை வினைமுற்று, ஏவல் வினைமுற்று, வியங்கோளள் வினைமுற்று, குறிப்பு வினைமுற்று, இடைச்சொல்லின் இலக்கணம் - வகைகள், உரிச்சொல்லின் இலக்கணம் - வகைகள்

அலகு– 5 இலக்கிய வரலாறு **10 மணி**

1. பதினெண் கீழ்க்கணக்கு நூல்கள்

2.உரைநடையின் தோற்றமும் வளர்ச்சியும்

பயிற்சிக்குரியன - மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழில்)

பாடநூல்கள் :

1. ச.வே.சுப்பிரமணியன், இலக்கிய வரலாறு, மணிவாசகர் பதிப்பகம் 31, சிங்கர் தெரு பாரிமுனை, சென்னை 600 108
2. தண்டபாணி தனிப்பாடல் திரட்டு உரை (மூலமும் உரையும்), உமா பதிப்பகம், 58 ஐயப்ப செட்டி தெரு, மண்ணடி, சென்னை 600 001.
3. பேரா. முனைவர் மு.பெரி.மு.இராமசாமி, திருக்குறள், ஸ்ரீ இந்து பப்ளிகேஷன்ஸ், 40 பஞ்சால் சுப்பிரமணிய தெரு, சென்னை 600 017.
4. பேரா. மாணிக்கம், நாலடியார் தெளிவுரை, மணிவாசகர் பதிப்பகம், சென்னை 6 ஆம் பதிப்பு, ஆகஸ்ட் 2014.
5. கவிஞர் பத்மதேவன், நீதி நூல் களஞ்சியம், கொற்றவை வெளீயீடு, 4/2 சுந்தரம் தெரு, சென்னை - 600017. முதற்பதிப்பு 2014
6. எளிய நடையில் தமிழ் இலக்கணம் - சுரா பதிப்பகம், அண்ணாநகர், சென்னை-40. முதற்பதிப்பு 2012.

பார்வை நூல்:

ச.வே.சுப்பிரமணியன், பதினெண் கீழ்க்கணக்கு நூல்கள் (மூலமும் தெளிவுரையும்) ,

மணிவாசகர் பதிப்பகம், 31 சிங்கர் தெரு, பாரிமுனை, சென்னை 600 108.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART – II	ENGLISH: II	24LEU02	ENGLISH - II	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
I	**II**	**25**	**75**	**100**

PREAMBLE :

To make the students understand the various literary forms in English Literature.

COURSE OUTCOME:

On the successful completion of the course, Students will be able to

COs	CO Statement	Knowledge Level
CO1	Recognize contextual meaning of the word.	**K1**
CO2	Communicate effectively using wider range of vocabulary.	**K2**
CO3	Apply their acquired knowledge to identify the sentence structure.	**K3**
CO4	Examine the themes and literary devices.	**K4**
CO5	Assess the passages for logical arrangement of sentences in a given text.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO2	**9**	**3**	**3**	**3**	**1**	**1**	**1**
CO3	**3**	**3**	**3**	**1**	**1**	**1**	**1**
CO4	**3**	**1**	**1**	**1**	**1**	**1**	**1**
CO5	**1**	**1**	**1**	**1**	**1**	**0**	**0**
Total contribution of COs to POs Weightage	**25**	**17**	**17**	**9**	**7**	**6**	**6**
Weight Percentage of COs contribution to POs	**1.84**	**1.55**	**1.87**	**1.16**	**1.82**	**1.86**	**2.48**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

UNIT I: Poetry **(7 Hours)**

1. Stopping by woods on a snowy evening - Robert Frost
2. How do I Love thee? - Elizabeth Barrett browning
3. Don'ts– D.H.Lawrence

UNIT II: Prose **(8 Hours)**

1. Positive Thinking- Francie Baltazar-Schwartz
2. The Last Cab Ride- Kent Nerburn
3. Toasted English – R.K.Narayan

UNIT III: Short Stories **(9 Hours)**

1. The Postmaster - Rabindranath Tagore
2. Springtime- O.Henry
3. The Lady, or the Tiger? - Frank R. Stockton

UNIT IV: One-Act Play **(10 Hours)**

1. The Death Trap – Saki
2. **Moonshine -** Arthur Hopkins

UNIT V: Grammar and Composition **(14 Hours)**

1. Tenses
2. Articles
3. Letter Writing

TEXT BOOKS: SEVENTH SENSE

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE: V	24AMU05	PROGRAMMING IN JAVA	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	25	75	100

PREAMBLE:

To understand the basic programming constructs of Java Language.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Outline the basic concepts of Java Programming Language	K1
CO2	Explain the concepts of tokens, control structures and looping, arrays, applet programming and Exception handling	K2
CO3	Classify various concepts that can be used for practical solutions	K3
CO4	Analyze wide range of Applications by using java programming	K4
CO5	Determine the usage of all given concepts in the Development of programming solutions	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

Pos / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	3	9	9	9	9	9
CO2	9	3	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of Cos to POs	45	15	45	45	45	45	45
Weighted Percentage of COs Contribution To POs	2.49	1.10	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3–Medium correlation;

9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I Fundamentals of Object-Oriented Programming (12 Hours)

Basic Concepts of Object-Oriented Programming – Benefits Object-Oriented Programming – Application of Object-Oriented Programming. Java Evolution: Features – How Java differs from C and C++. Overview of Java: Simple Java Program – Structure – Java Tokens – Statements – Java Virtual Machine.

UNIT- II Control Structures (15 Hours)

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: If, If..Else, Nested If, Switch, ?: Operator - Decision Making and Looping: While, Do, For – Jumps in Loops - Labeled Loops – Classes, Objects and Methods.

UNIT- III Arrays, Strings and Vectors (15 Hours)

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.

UNIT- IV Programming with JAVA (15 Hours)

Applet Programming – Graphics Programming.

UNIT- V Managing Input/output Files in Java (15 Hours)

Concepts of Streams - Stream Classes – Byte Stream Classes – Character Stream Classes – Using Streams – I/O Classes – File Class – I/O Exceptions - Creation of Files.

TEXTBOOK(S):

1.E.Balagurusamy, Programming with Java Primer,3rdEdition, TMH.

REFERENCE BOOK(S):

1. Patrick Naughton & Hebert Schildt,The Complete Reference Java2, 3rd Edition,TMH.
2. John R.Hubbard,Programming with Java, 2nd Edition,TMH.

WEB REFERENCES:

1. https://www.javatpoint.com/java-basics
2. https://www.w3schools.com/java/
3. https://www.softwaretestinghelp.com/java-basics-and-core-java-concepts/
4. https://www.iitk.ac.in/esc101/share/downloads/javanotes5.pdf5.https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:VI PRCATICAL:II	24AMU06	PROGRAMMING IN JAVA-PRACTICAL	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	40	60	100

PREAMBLE:

To understand the basic programming constructs of Java Language.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Determine the basic concepts of Java Programming Language	K1
CO2	Apply the concepts of arrays and string	K2
CO3	Analyse the concepts of inheritance	K3
CO4	Demonstrate the interface and threads	K4
CO5	Applying the java programming techniques in graphics and applet programming	K5

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

CO – PO MAPPING (COURSE ARTICULATION MATRIX)

POs/COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	3	9	9	9	9	9
CO2	9	3	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of Cos to POs	45	15	45	45	45	45	45
Weighted Percentage Of Cos Contribution to POs	2.49	1.10	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation;

9-High correlation between Cos and POs.

PRACTICAL LIST

1. Design a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object

2. Demonstrate a Java Program to demonstrate use of subclass

3. Create a Java Program to implement array of objects

4. Construct a Java program to practice using String class and its methods

5. Apply a Java program to practice using String Buffer class and its methods

6. Design a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods

7. Generate a program to demonstrate use of implementing interfaces

8. Apply a program to Implementing Thread based applications

9. Create a program using Applet to display a message in the Applet

10. Design an applet program working with Colors and Fonts

11. Construct a program using Applet for configuring Applets by passing parameters

12. Design programs for using Graphics class

- to display basic shapes and fill them
- draw different items using basic shapes
- set background and foreground colors

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART– III	CORE: VII PRACTICAL:III	24AMU07	INTERNET BASICS-PRACTICAL	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	40	60	100

PREAMBLE:

To learn about the operations of Internet.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Able to learn the basics concepts of Internet, Web Browsers	K1
CO2	Explore the usage of internet concepts and analyze its components	K2
CO3	Apply the online information resources	K3
CO4	Analyze and utilize the appropriate Google Apps for education effectively	K4
CO5	Evaluate and determine the usage of all online information resources	K5

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

CO – PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	9	9
CO5	9	9	9	9	9	9	9
Total Contribution of Cos to POs	45	45	45	45	45	45	45
Weighted Percentage of Cos Contribution to POs	2.49	3.30	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0– No correlation; 1 – Low correlation;3 – Medium correlation;

9-High correlation between Cos and POs.

PRACTICAL LIST

1. Create an email-id.

2. Compose and send a mail.

3. Forward a mail and to reply for a mail.

4. Send a mail with an attachment.

5. Download the attached document of a mail received.

6. Send a mail to a large number of recipients using cc and bcc options.

7. Search a thing using a search engine.

8. Open and read newspaper sites, TV programs schedules using Internet.

9. Verify a university/college details by opening their websites.

10. Upload your resume with any one job portal.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credits
PART-III	CORE :VIII ALLIED : II	24AMU08	APPLIED MATHEMATICS	**72**	**3**

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	25	75	100

PREAMBLE:

To enable the students to gain knowledge about set theory, graph theory, grammars, measures of central tendency and probability.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

CO's	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic terms of set operations, graphs, grammars, Measures of Central Tendency and probability.	**K_1**
CO2	explain the concepts of sets, graphs, grammars, Measures of Central Tendency and probability.	**K_2**
CO3	apply the various formulae to solve the problems based on set operations, graphs, grammars, Measures of Central Tendency and probability.	**K_3**
CO4	analyze the relationships between mean , median and mode, set operations, graphs, grammar and probability.	**K_4**
CO5	evaluate the problems on sets, graphs, grammars, Measures of Central Tendency and probability.	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	3	1	1	1
CO5	3	3	3	3	0	0	0
Total Contribution of COs to POs	39	39	39	33	10	10	10
Weighted Percentage of COs contribution to POs	2.16	2.86	2.41	2.19	0.85	0.94	0.95

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT

UNIT – I Sets (15 Hours)

Introduction – sets and its element – set description – types of sets – Venn-Euler diagram – set operations and laws of set theory.

UNIT – II Graph Theory (15 Hours)

Introduction – basic terminology – Paths, Cycles and Connectivity – sub graphs – types of graphs – isomorphic graphs – homeomorphic graphs – representation of graphs in computer memory.

UNIT – III Language, Grammar and Automata (15 Hours)

Introduction – Language: The set theory of strings – Languages – regular expressions and regular languages – Grammar – Finite state machine - Finite state Automata.

UNIT – IV Measures of Central Tendency (15 Hours)

Mean, Median and Mode – Relationship among mean median and mode.

UNIT – V Probability (12 Hours)

Random Experiment – relative frequency approach – example problems
(Method – I, II, III and IV)

TEXT BOOK:

Book 1 - Sharma.J.K. (Fifth Edition) – "Discrete Mathematics", University Science Press (An imprint of Laxmi Publications Pvt. Ltd.) **(Unit I, II and III)**

Book 2 - P.A.Navanitham (Revised Edition -2012) "Business Mathematics and Statistics", Jai Publishers, Trichy-21, April 2012. **(Unit IV & V)**

UNIT	Book 1 and Book 2	CHAPTER	PAGE NO.
I	Book 1	1	2 - 18
II	Book 1	9	258 - 287
III	Book 1	15	518 – 526, 532-538,540 - 554
IV	Book 2	Part 2	159-181,196-226.
V	Book 2	Part 2	654 - 679

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	FOUNDATION:II	24FCU02	YOGA AND ETHICS	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
I	II	50	-	50

PREAMBLE:

To enable the learners to acquire the knowledge on basic yogasanas and values and practice the mineral life.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recollect the basic terminologies in yoga and value education	**K1**
CO2	Demonstrate the importance of yoga, mental exercises, principles of life and components of values.	**K2**
CO3	Apply the techniques of dynamic & mental exercises and philosophical values in real life	**K3**
CO4	Classify the different types of asanas, stages of mind, analysis of thought, ethical values and social values.	**K4**
CO5	Evaluatehowtheyogaandvalueeducationmakeapersonstrongbothphysicallyandmentally	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	3	1	1	3
CO2	9	9	9	3	3	1	3
CO3	9	9	9	3	3	3	3
CO4	9	9	9	3	3	3	3
CO5	9	9	9	3	3	3	3
Total Contribution of Cos to POs	45	45	45	15	13	11	15
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	1.00	1.11	1.04	1.42

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I YOGA AND HEALTH (5 Hours)

Theory:

Yoga - Meaning - Importance of Yoga – Pancha Koshas - Benefits of Yoga - General Guidelines.

Practice:

Dynamic Exercise - Surya Namaskar - Basic Set of Asanas - Pranayama & Kriya.

UNIT- II ART OF NURTURING THE MIND (5Hours)

Theory:

Ten Stages of Mind - Mental Frequency – Methods for Concentration Eradication of Worries - Benefits of Blessings - Greatness of Friendship - Individual Peace and World Peace.
Practice: Worksheet.

UNIT- III PHILOSOPHY AND PRINCIPLES OF LIFE (5 Hours)

Purpose and Philosophy of Life - Introspection – Analysis of Thought - Moralization of Desires - Neutralization of Anger. Vigilance and Anti-Corruption - Redressal mechanism – Urban planning and Administration.

Practice: Worksheet.

UNIT- IV VALUE EDUCATION (Part-I) (5 Hours)

Ethical Values: Meaning – Need and Significance - Types - Value education – Aim of education and value education. Components of value education: Individual values – Self-discipline, Self-confidence, Self-initiative, Empathy, Compassion, Forgiveness, Honesty, Sacrifice, Sincerity, Self-control, Tolerance, and Courage.
Practice: Worksheet.

UNIT- V VALUE EDUCATION (Part-II) (4 Hours)

Family Values - Constitutional or National values – Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom and Fraternity. Social values – Pity and probity, self-control, universal brotherhood. Professional values – Knowledge thirst, sincerity in profession, regularity, punctuality, and faith. Religious values – Tolerance, wisdom, character.

Practice: Worksheet.

REFERENCE BOOKS:

1. Vethathiri Maharishi (2015), ‘Yoga for human excellence’ - Sri Vethathiri Publications. Value Education for human excellence - study material by Bharathiar University. Value Education - Study Material by P.K.R Arts College for Women.

மூன்றாம் பருவம்

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART : I	LANGUAGE: III	24LTU03	TAMIL - III	48	3

Contact hours per week : 4

Year	Semester	Internal marks	External marks	Total Marks
II	III	25	75	100

முகப்புரை:

காப்பியங்கள் , நவீன இலக்கியம் மற்றும் அணியிலக்கணம் குறித்து அறிவர்.

COURSE OUTCOME:

பொதுத்தமிழ் கற்பதன் மூலம் கீழ்க்காணும் பயிற்யினை பெறுவர்.

COs	CO Statement	Knowledge Level
CO1	காப்பியங்கள் உணர்த்தும் அன்பு நெறியை உணர்தல்	K1
CO2	நவீன இலக்கியங்களின் தன்மைகளைப் புரிந்து கொள்ளுதல்.	K2
CO3	அணி இலக்கணம் கற்று கொள்வதன் வாயிலாக படைப்பாளுமையை வளர்த்தல்.	K3
CO4	இலக்கணங்களைப் பயில்வதன் மூலம் இலக்கணங்களை உருவாக்க முடியும்.	K4
CO5	காப்பியங்கள் வாயிலாக பெண் கதாபாத்திரத்தைத் திறனாய்தல்.	K5

K1:Remember Level , K2:UnderstandLevel , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	9	3
CO2	3	9	9	9	9	9	9
CO3	9	9	3	9	9	3	9
CO4	9	9	9	9	3	3	3
CO5	9	3	9	9	9	3	3
Total contribution of COs to POs Weightage	39	39	39	45	33	27	27
Weight Percentage of COs contribution to POs	**1.98**	**2.47**	**2.46**	**2.87**	**2.74**	**2.22**	**2.49**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

அலகு– 1 காப்பியங்கள் **10 மணி**

சிலப்பதிகாரம் - ஊர்சூழ் வரி (75 வரிகள்)
இயேசுகாவியம் - பாரச்சிலுவை,தாயும் சேயும்,கசிந்தநெஞ்சங்கள்.
சீறாப்புறாணம் - மானுக்குப் பினைநின்றபடலம்.

அலகு– 2 புராணம் **10 மணி**

கம்பராமாயணம் - கைகேயி சூழ்வினைப்படலம் (40 பாடல்கள்)
பெரியபுராணம் - காரைக்கால் அம்மையார் புராணம் (66 பாடல்கள்)

அலகு– 3 நாவல் **10 மணி**

வாடிவாசல் - சி.சு.செல்லப்பா

அலகு– 4 இலக்கணம் **10 மணி**

அணி இலக்கணம்

உவமையணி–எடுத்துக்காட்டுஉவமையணி–வஞ்சப் புகழ்ச்சியணி–சொற்பொருள் பின்வருநிலையணி–தீவகயணி.

அலகு– 5 இலக்கிய வரலாறு **8 மணி**

புதினத்தின் தோற்றமும் வளர்ச்சியும்,
காப்பியங்களின் தோற்றமும் வளர்ச்சியும் (ஐம்பெருங்காப்பியங்கள்,ஐஞ்சிறுங்காப்பியங்கள்)
பொதுக்கட்டுரை.

பாடநூல்கள்:

1. ந.மு.வேங்கடசாமிநாட்டார் - சிலப்பதிகாரம் - ராமையாபதிப்பகம்,சென்னை - 600 014.
2. ந.மு. வேங்கடசாமிநாட்டார்,ஔவை சு. துரைசாமிப்பிள்ளை - மணிமேகலை - சாரதாபதிப்பகம், ஜி-4,சாந்திஅடுக்ககம்,ராயப்பேட்டை,சென்னை.
3. உமறுப்புலவர்,சீறாப்புராணம்,முல்லைநிலையம், 9,பாரதிநகர்,தி.நகர்,சென்னை. முதற்பதிப்பு -2009.
4. வ.த.இராமசுப்பிரமணியம் - பெரியபுராணம்,திருமகள் நிலையம்,தி.நகர்,சென்னை.
5. வாடிவாசல் - சி.சு.செல்லப்பா,காலச்சுவடுபதிப்பகம்,பதிப்பு 2009, 669,கே.பி.ரோடு,நாகர்கோவில்

பார்வை நூல்:

1. தமிழ் இலக்கியவரலாறு–பேரா.மது.ச.விமலானந்தம்,முல்லைநிலையம், 9,பாரதிநகர்,- முதல் தெரு,தி.நகர்,சென்னை - 17

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART – II	ENGLISH :III	24LEU03	ENGLISH - III	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
II	**III**	**25**	**75**	**100**

PREAMBLE :

To cater the most required LSRW skills in students along with bridging the gap among perception, communication and practice of the English Language.

COURSE OUTCOME :

On the successful completion of the course, Students will be able to

COs	CO Statement	Knowledge Level
CO1	Recognize the genres in literature.	**K1**
CO2	Explain the literary devices and themes used in the works.	**K2**
CO3	Make oral presentation on any given situation.	**K3**
CO4	Examine the sentence structure and types of advertisements.	**K4**
CO5	Assess the situations and concepts to construct dialogues and slogans.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO2	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO3	**9**	**3**	**3**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**1**	**1**	**0**
CO5	**3**	**3**	**1**	**1**	**0**	**0**	**0**
Total contribution of COs to POs	**33**	**27**	**17**	**9**	**8**	**6**	**5**
Weight Percentage of COs contribution to POs	**2.42**	**2.45**	**1.87**	**1.16**	**2.08**	**1.86**	**2.07**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;

9- High correlation between COs and POs.

COURSE CONTENT

UNIT I: POETRY **(9 Hours)**

1. The Highwayman - Alfred Noyes
2. Do Not Go Gentle into That Good Night - Dylan Thomas
3. A Different History - Sujata Bhatt

UNIT II: PROSE **(9 Hours)**

1. Tree Speaks - C.Rajagopalachary
2. Third thoughts – E.V.Lucas
3. On the Rule of the Road – A.G.Gardiner

UNIT III: SHORT STORIES **(9 Hours)**

1. The Monkey' Paw – W.W.Jacobs
2. The Thief's Story - Ruskin Bond
3. A Hero- R.K.Narayan

UNIT IV: ONE-ACT PLAY **(8 Hours)**

1. Mother's Day – J.B.Priestly
2. The Proposal – Anton Checkhov

UNIT V: GRAMMAR AND COMPOSITION **(13 Hours)**

1. Concord
2. Dialogue writing
3. E-Mail writing

TEXT BOOK: LILACS

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:IX	24AMU09	PROGRAMMING IN PYTHON	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
II	III	25	75	100

PREAMBLE:

The Course offers the understanding of basic principles in python and skills to create computer programs for small scale usage.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall syntax and semantics of various programming Constructs.	**K1**
CO2	Illustrate the process of structuring data using lists, tuples, and dictionaries	**K2**
CO3	Identify appropriate programming structure for a real-time applications	**K3**
CO4	Apply file concepts in various aspects	**K4**
CO5	Infer the object oriented concepts in python	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of Cos to POs	45	27	45	45	45	45	45
Weighted Percentage of Cos Contribution to POs	2.49	1.98	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I Basics and Functions (12 Hours)

The way of the program: What is a program? - Running Python. - The first program. - Arithmetic operators - Values and types - Variables, expressions, and statements: Assignment statements - Variable names - Expressions and statements - Script mode - Order of operations - String operations - Comments – Debugging. **Functions:** Function calls - Math functions - Composition – Adding new functions – Definition and uses - Flow of execution - Parameters and arguments - Variables and parameters are local - Fruitful functions and void functions - Why functions?

UNIT- II Conditionals, Recursion, Iteration, Strings (15 Hours)

Conditionals and Recursion: Floor division and modulus - Boolean expressions - Logical operators - Conditional execution - Alternative execution - Chained conditionals - Nested conditionals Recursion - Infinite recursion – Keyboard input. **Fruitful functions:** Return values Incremental development - Composition - Boolean functions. **Iteration:** Reassignment - Updating variables - The while statement - break - Square roots - **Strings:** String is a sequence - Traversal with a for loop - String slices - Strings are immutable - Searching - Looping and counting - String methods - The in operator - String comparison.

UNIT- III Lists, Dictionaries, Tuples (15 Hours)

Lists: A list is a sequence - Lists are mutable - Traversing a list - List operations - List slices - List methods - Map, filter, and reduce - Deleting elements - Lists and strings Objects and values - Aliasing - List arguments. **Dictionaries:** A dictionary is a mapping - Dictionary as a collection of counters - Looping and dictionaries - Reverse lookup Dictionaries and lists - Memos - Global variables.Tuples: Tuples are immutable - Tuple assignment - Tuples as return values - Variable-length argument tuples - Lists and tuples - Dictionaries and tuples.

UNIT- IV Files, Classes and Objects (15 Hours)

Files: Persistence - Reading and writing - Format operator - Filenames and paths - Catching exceptions - Databases - Pickling - Pipes - Writing modules. **Classes and objects:** Programmer-defined types - Attributes - Rectangles - Instances as return values - Objects are mutable Copying - Classes and Functions: Time - Pure functions - Modifiers - Prototyping versus planning.

UNIT- V Classes and Methods (15 Hours)

Classes and methods: Object-oriented features - Printing objects - Another example - A more complicated example - The init method - The str method - Operator overloading - Type-based dispatch - Polymorphism - Interface and implementation - Inheritance: Card objects - Class attributes Comparing cards - Decks Printing the deck, add, remove, shuffle, and sort - Inheritance - Class diagrams - Data encapsulation.

TEXTBOOK

1.Allen B .Downey, “Think Python: How to Think Like a Computer Scientist” ,2nd Edition 2012, O’Reilly.

REFERENCEBOOKS

1. Kenneth A. Lambert, “Fundamentals of Python First Programs”, Second Edition
2. Rashi Gupta, “Making Use of Python”, Willey publishing Inc

WEBREFERENCES:

1. https://www.w3schools.com/python/python_intro.asp
2. https://www.geeksforgeeks.org/python-programming-language/
3. https://www.programiz.com/python-programmingg
4. https://www.geeksforgeeks.org/file-objects-python/
5. https://www.geeksforgeeks.org/python-classes-and-objects/

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:X PRACTICAL:IV	24AMU10	PROGRAMMING IN PYTHON-PRACTICAL	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
II	III	40	60	100

PREAMBLE:

The course offers the understanding of basic principles in python and skills to create computer programs for small scale usage.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Demonstrate the various programming constructs.	**K1**
CO2	Illustrate the process of structuring data using lists, tuples, and dictionaries	**K2**
CO3	Identify appropriate programming structure for a real-time applications	**K3**
CO4	Apply file concepts in various aspects	**K4**
CO5	Infer the object oriented concepts in python	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	3	9	9	9	9	9
CO4	9	3	9	9	9	9	9
CO5	9	3	9	9	9	9	9
Total Contribution of Cos to POs	45	27	45	45	45	45	45
Weighted Percentage Of Cos Contribution to POs	2.49	1.98	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation;

9-High correlation between COs and POs

PRACTICAL LIST

1. Write a program to find prime numbers between 1 to n.
2. Construct a program to print the decimal equivalents of 1/2, 1/3, 1/4,… 1/n.
3. Design a program to check given number is Armstrong or not.
4. Simulate a basic calculator using various arithmetic operators.
5. Compute GCD and LCM of two numbers using functions.
6. Develop a program to accept a line of text and find the number of characters, number of vowels and number of blank spaces in it.
7. Demonstrate various List operations.
8. Write a program to create a List and split it into two lists for odd and even numbers.
9. Design a program to create a tuple and perform various slicing operations.
10. Build a program to display the file contents and copy the file contents from one file to another.
11. Develop a program to create a dictionary, add a key-value pair, change and retrieve the values based on the key.
12. Develop a program to implement class and object concepts.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART:III	CORE:XI ALLIED: III	24AMU11	ARTIFICIAL INTELLIGENCE & KNOWLEDGE REPRESENTATION	72	3

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
II	III	25	75	100

PREAMBLE:

The course offers the understanding of how to create intelligent machines.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	**K1**
CO2	Understanding the concepts of problem solving methods	**K2**
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	**K3**
CO4	Understanding about the basic concepts of Software agents and representation of knowledge	**K4**
CO5	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	**K5**

K1–Remember;K2– Understand;K3–Apply;K4– Analyse;K5–Evaluate.

CO-POMAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	3	9	9	3	3	3
CO4	9	3	9	3	3	3	3
CO5	9	3	9	3	1	1	1
Total Contribution of Cos to POs	45	27	45	33	25	25	25
Weighted Percentage Of COs Contribution to POs	2.49	1.98	2.78	2.19	2.13	2.36	2.36

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I **Introduction** **(15 Hours)**

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems.

UNIT- II **Problem Solving Methods** **(15 Hours)**

Problem Solving Methods – Search Strategies – Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

UNIT- III **Knowledge Representation** **(15 Hours)**

Knowledge Representation – First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining – Backward – Chaining – Resolution – Knowledge Representation – Ontological Engineering – Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information.

UNIT- IV **Software Agents** **(15 Hours)**

Software Agents – Architecture for Intelligent Agents – Agent Communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent Systems.

UNIT- V **AI Applications** **(12 Hours)**

AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning-Moving.

TEXTBOOK(S)

1.S.RussellandP.Norvig,–ArtificialIntelligence:AModernApproach‖,PrenticeHall,Third Edition,2009.
2.I. Brat ko, -Prolog: Programming for Artificial Intelligence, Fourth Edition, Addison-Wesley Educational Publishers Inc.,2011.

REFERENCEBOOK(S) :

1.M.Tim Jones, Artificial Intelligence: A Systems Approach (ComputerScience), Jones and Bartlett Publishers Inc.; First Edition,2008
2.NilsJ.Nilsson,-TheQuestforArtificialIntelligence,CambridgeUniversityPress,2009.
3.David L. Poole and Alan K. Mack worth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

WEB REFERENCES:

1. **https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp**
2. **https://www.javatpoint.com/problem-solving-techniques-in-ai**
3. **https://www.javatpoint.com/knowledge-representation-in-ai**
4. **https://youtu.be/bvrhcsQHRNo?si=nb6NYmPs2P6xdO-l**

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	ABILITY ENHANCEMENT: I	24AEU01	INFORMATION SECURITY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
II	III	50	-	50

PREAMBLE:

To learn about the basics of information security.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall the fundamental concepts of Information Security, Risk and Security policies	**K1**
CO2	Discuss the concepts of Risks, vulnerabilities, ethical and privacy issues	**K2**
CO3	Apply the ideas in security planning and construct the policies	**K3**
CO4	Categorize the Privacy, Ethical Issues, Laws, Software Issues and Crimes	**K4**
CO5	Summarize Cryptography, cipher text and threats in Information security	**K5**

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

CO-PO MAPP ING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	3	1	1
Total Contribution of Cos to POs	45	45	45	45	27	16	19
Weighted Percentage of Cos Contribution To POs	2.49	3.30	2.78	2.99	2.30	1.51	1.80

Level of correlation: 0–No correlation; 1 –Low correlation; 3–Medium correlation;

9-High correlation between Cos and POs.

COURSE CONTENT

UNIT- I **Introduction to Information Security** **(5 Hours)**

Information Security: Principles, Concepts and Definitions - The need for Information Security - Benefits of Information Security. The Security Problem in Computing: The Meaning of Computer Security - Computer Criminals.

UNIT- II **Information Risk** **(4 Hours)**

Information Risk: Threats and Vulnerabilities of Information Systems – Introduction to Risk Management. Information Security Management Policy, Standards and Procedures.

UNIT- III **Security Planning** **(5 Hours)**

Administering Security: Security Planning - Security Planning Team Members - Assuring Commitment to a Security Plan - Business Continuity Plan - Incident Response Plan - Organizational Security Policies, Physical Security.

UNIT- IV **Privacy and Ethical Issues in Information Security** **(5 Hours)**

Legal Privacy and Ethical Issues in Information Security: Protecting Programs and Data - Information and the Law - Rights of Employees and Employers - Software Failures - Computer Crime - Ethical Issues in Information Security.

UNIT -V **Cryptography** **(5 Hours)**

Cryptography: Introduction to Cryptography - What is Cryptography – Plain Text – Cipher Text – Substitution Ciphers - Transposition Ciphers.

TEXTBOOK(S):

1. Sumitra Kisan and D. Chandrasekhar Rao, Information Security Lecture Notes, Department of Computer Science and Engineering & Information Technology, Veer Surendra Sai University of Technology (Formerly UCE, Burla) Burla, Sambalpur, Odisha.

REFERENCE BOOK(S):

1. Andy Taylor (Editor), David Alexander, Amanda Finch & David Sutton, Information Security Management Principles An ISEB Certificate, The British Computer Society, 2008.

WEB REFERENCES:

1. https://www.imperva.com/learn/data-security/information-security-infosec/#:~:text=Information%20security%20protects%20sensitive%20information,financial%20data%20or%20intellectual%20property.
2. https://www.geeksforgeeks.org/what-is-information-security
3. https://www.techtarget.com/searchsecurity/definition/information-security-infosec
4. https://www.exabeam.com/information-security/information-security
5. https://www.sans.org/information-security

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	NON-MAJOR ELECTIVE	24NMU01A	INDIAN WOMEN AND SOCIETY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
II	III	50	-	50

PREAMBLE:

To familiarize students with the specific cultural contexts of women in India

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Know women status in Indian society as an academic discipline	K1
CO2	Interpret the various roles of women, challenges and Issues faced by them in the society	K2
CO3	Find out solutions to their legal issues and product themselves from the violence against women emphasize on women entrepreneurship for their empowerment	K3
CO4	Critically analyze the lifestyle and challenges of women	K4
CO5	Discuss the importance of women health and issues Related to women in general	K5

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

CO – PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	0	0	0
CO2	9	9	9	9	3	0	3
CO3	9	9	9	9	9	9	9
CO4	3	3	3	9	9	9	9
CO5	3	3	1	1	1	9	9
Total Contribution of COs to POs	33	33	31	37	22	27	30
Weighted Percentage of COs Contribution to POs	1.83	2.42	1.92	2.46	1.88	2.54	2.84

Level of correlation: 0–No correlation; 1–Low correlation; 3–Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I **Historical Background** **(5 Hours)**

History of Women's status from Vedic times, Women's participation in India's Pre and Post-Independence movement and Economic Independence, fundamental rights and importance of women in Modern Society.

UNIT- II **Role of Women (Challenges & Remedies)** **(5 Hours)**

Women in Family, Agriculture, Education, Business, Media, Defense, Research and Development, Sports, Civil Services, Banking Services, Social Work, Politics and Law.

UNIT- III **Women and Health** **(5 Hours)**

Women and health issues, Malnutrition, Factors leading to anemia, Reproductive maternal health and Infant mortality, Stress.

UNIT- IV **Issues of Women** **(5 Hours)**

Women's issues, Dowry Related Harassment and Dowry Deaths, Gender based violence against women, Sexual harassment, Loopholes in Practice to control women issues.

UNIT -V **Women Empowerment** **(4 Hours)**

Meaning, objectives, Problems and Issues of Women Empowerment, Factors leading to Women Empowerment, Role and Organization of National Commission for Women, Central and State Social Welfare Board for Women Empowerment, Reality of women empowerment in the era of globalization.

REFERENCEBOOK(S)

S.No	Authors	Title	Publishers	Year of Publication
1	Mala Khullar	Writing the Women's Movement : A Reader	Zubaan	2005
2	IAWS	The State and the Women's Movement in India	IAWS, Delhi	1994
3	Kosambi, Meera	Crossing Thresholds : Feminist Essays in Social History	Permanent Black	2007
4	T Rowbotham, Sheila	Hidden from History: Women's Oppression and the Fight against It	Pluto Press, London	1975
5	Susheela Mehta	Revolution and the Status of Women	Metropolitan Book Co.pvt ltd, New Delhi	1989

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART: IV	NON- MAJOR ELECTIVE	24NMU01B	**அடிப்படைத் தமிழ் (Advanced Tamil)**	24	2

Contact hours per week : 2

Year	Semester	Internal marks	External marks	Total Marks
II	**III**	**50**	**-**	**100**

முகப்புரை:

எழுத்துக்களின் வகைமைகள், சொற்றொடர் அமைப்பு, மாற்றம் குறித்து அறிந்து கொள்வர்.

COURSE OUTCOME

அடிப்படைத் தமிழ் கற்பதன் வாயிலாகக் கீழ்க்காணும் தன்மைகளை அறிவர்.

COs	CO Statement	Knowledge Level
CO1	தமிழ் மொழியின் அடிப்படைக் கூறுகளை அறிவர்.	K1,K2
CO2	எழுத்துக்களின் வகைமைகளைக் கற்பர்.	K3
CO3	சொற்பொருள் மாற்றங்களை அறிந்து பின்பற்றுவர்.	K3,K5
CO4	சொற்றொடர் அமைப்பினைப் பகுத்தாராய்வர்.	K4
CO5	தமிழ் மொழியின் மேன்மையை உணர்ந்து மதிப்பிடுவர்.	K5

K1:RememberLevel , k2:UnderstandLevel , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	3	3	9	3	9
CO2	9	9	9	3	3	3	3
CO3	9	9	9	9	3	9	3
CO4	9	9	9	9	3	9	9
CO5	9	9	9	9	9	3	9
Total Contribution of COs to POs	45	45	39	33	27	27	33
Weightage Percentage of COs contribution to POs	**2.29**	**2.85**	**2.46**	**2.10**	**2.24**	**2.22**	**3.04**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

இளங்கலை 2021-22 கல்வியாண்டு முதல் சேர்வோர்க்குரியது

(12-ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு)

புற மதிப்பீட்டுத் தேர்வு மட்டும்

1. தமிழ் மொழியின் அடிப்படைக் கூறுகள்.
   எழுத்துகள் : முதலெழுத்துகள் (உயிர் எழுத்து, மெய் எழுத்து, உயிர்மெய் எழுத்து)
   சொற்கள் : பெயர்ச்சொல், வினைச்சொல், இடைச்சொல், உரிச்சொல்
   தொடர் : தொடரமைப்பு (எழுவாய், செயப்படுபொருள், பயனிலை)
2. குறிப்பு எழுதுதல் : பத்துப் பதினைந்து தொடர்களில் குறிப்பு வரைதல்
   பிழைநீக்கி எழுதுதல் : (ஒற்றுப்பிழை, எழுத்துப்பிழை)

2021– 2022 கல்வியாண்டு முதல் பயில்பவர்களுக்குப் பின்வரும் வினாத்தாள் அமைப்பு பின்பற்றப்பட வேண்டும்.

Course	Sections	Assessment Domain	Marks and Unit Weightage	Total ESE
Non-Major Elective I (Basic Tamil)	**Section A**	K1: Remember Level K2: Understand Level	4 X 5 = 20 Four out of Six *(Open choice)* *(At least one question from each unit)*	50*
	Section B	K3: Apply Level K4: Analyze Level K5: Evaluate Level	3 X 10 = 30 Three out of Five *(Open choice)* *(At least one question from each unit)*	

நான்காம் பருவம்

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART: I	LANGUAGE : IV	24LTU04	Tamil -IV	48	3

Contact hours per week : 4

Year	Semester	Internal marks	External marks	Total Marks
II	IV	25	75	100

முகப்புரை:

சங்க இலக்கிய நூல்களின் அறிமுகத்தினையும் பாடல் மேன்மையையும் அறிவர்.

COURSE OUTCOME:

பொதுத்தமிழ் நான்கு கற்பதன் வழி கீழ்காணும் தன்மையைப் பெறுவர்.

COs	CO Statement	Knowledge Level
CO1	எட்டுத்தொகை நூல்கள் மற்றும் பத்துப்பாட்டு நூல்கள் குறித்த அறிவைப் பெறுவர்..	K1
CO2	சங்ககால மக்களின் வாழ்வியல் விழுமியங்களை சங்க இலக்கிய அகப்புறப் பாடல்களின் வழி கற்பர்.	K2
CO3	சங்கப் பாடல்களில் புலப்படும் உவமை , உருவகம், உள்ளுறை,இறைச்சி தன்மையை இன்றைய நவீன இலக்கியங்களுள் பொருத்திப் பார்ப்பர்.	K3
CO4	பட்டினப்பாலை உணர்த்தும் பண்டைய வணிகவியல் முறையோடு நவீன வணிக மேலாண்மையியலுடன் ஒப்பிட்டு பகுத்தாராய்வர்.	K4
CO5	கலித்தொகைப் பாடல்,பிசிராந்தையார் நாடகம் இவற்றின் மூலம் நாடகத்துறையின் பரிணாம வளர்ச்சியினை அறிந்து மதிப்பிடுவர்.	K5

K1:Remember Level , k2:UnderstandLevel , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	3	9	9	9	9
CO2	9	9	3	9	9	9	3
CO3	9	3	9	9	3	3	3
CO4	9	3	9	3	3	3	3
CO5	9	9	9	3	3	3	3
Total contribution of COs to POs Weightage	45	33	33	33	27	27	21
Weightage Percentage of COs contribution to POs	**2.29**	**2.09**	**2.08**	**2.10**	**2.24**	**2.22**	**1.94**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

அலகு– 1 **10 மணி**

நற்றிணை:குறிஞ்சி (83) பெருந்தேவனார் - ‘‘எம்ஊர் வாயில் உண்துறைத் தடையிய’’
குறுந்தொகை : குறிஞ்சி(24)ஔவையார் -‘‘அகவன் மகளேஅகவன் மகளே’’
ஐங்குறுநூறு:அன்னாய் வாழிபத்து–கபிலர் (203) - ‘‘அன்னாய் வாழிவேணடன்னைநம் படைப்பை’’
பதிற்றுப் பத்து–ஐந்தாம்பத்து–42 ஆம் பாடல் - பரணர் - ‘‘இரும்பனம் புடைய லீகைவான்கழல’’
பரிபாடல் :வையை 7 – ஆம் பாடல் - ‘‘இறுவரைபுரையுமாறு இருகரையேமத்து’’ (வரி- 40 -50)

புறநானூறு– 243 ஆம் பாடல் - குடவாயிற் கீத்தனார் - இளையோர் சூடார் வளையோர் கொய்யார்’’

அலகு– 2 **10 மணி**

பத்துப்பாட்டு
பட்டினப்பாலைமுழுவதும்

அலகு– 3 **10 மணி**

நாடகம் - பிசிராந்தையார் - பாரதிதாசன்

அலகு– 4 **10 மணி**

அகத்திணைப் பாகுபாடுகள்
புறத்திணைப் பாகுபாடுகள்

அலகு– 5 **8 மணி**

எட்டுத்தொகை-விளக்கம்
பத்துப்பாட்டு-விளக்கம்

படைப்பிலக்கியப் பயிற்சி

கவிதை,சிறுகதை,எழுதச்செய்தல்.

படைப்பிலக்கியப் பயிற்சி

கவிதை,சிறுகதை,எழுதச்செய்தல்.

பாடநூல்கள்:

1. குறுந்தொகை–கழகவெளியீடு–சென்னை,
2. நற்றிணை–கழகவெளியீடு–சென்னை,
3. பட்டினப்பாலை - நியூ செஞ்சுரிபுக் ஹவுஸ்,அம்பத்தூர்,சென்னை
4. பிசிராந்தையார் - பாரதிதாசன் மணிக்கவாசகர் பதிப்பகம் சென்னை-8
5. புறநானூறு –திருமகள் பதிப்பகம், 55,வெங்கட் நாராயணாசாலை,திநகர் சென்னை -17
6. புதிற்றுப்பத்து–வர்த்தமானன் பதிப்பகம்,ஏ.ஆர்.ஆர். காம்ப்ளெக்ஸ் , 141 உஸ்மான் சாலை,திநகர் சென்னை -17
7. ஐங்குறுநூறு–சைவசித்தாந்த நூற்பதிப்புக் கழகம்,சென்னை - 18
8. பரிபாடல் -சாரதாபதிப்பகம்,சென்னை -14 –முதற்பதிப்பு 2009.
9. கலித்தொகை - சாரதாபதிப்பகம்,சென்னை -14 –முதற்பதிப்பு 2009.
10. அகநானூறு - சாரதாபதிப்பகம்,சென்னை -14 – மூன்றாம் பதிப்பு 2012.

பார்வை நூல்:

1.இலக்கிய வரலாறு - கா.கோ. வேங்கடராமன்,கலையகவெளியீடுபரமத்திவேலூர் ,நாமக்கல்

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART – II	ENGLISH: IV	24LEU04	ENGLISH- IV	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
II	**IV**	**25**	**75**	**100**

PREAMBLE :

To acquaint the students an idea about the genres of English Literature with enhancing the communication competence among them.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Find the genres in literature.	**K1**
CO2	Summarize the literary devices used in the works.	**K2**
CO3	Make use of wider range of words and expressions in their writing.	**K3**
CO4	Examine the themes and techniques in literary works.	**K4**
CO5	Select appropriate words for writing.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO2	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO3	**3**	**3**	**3**	**1**	**1**	**1**	**1**
CO4	**3**	**3**	**1**	**1**	**1**	**1**	**0**
CO5	**3**	**1**	**1**	**1**	**1**	**0**	**0**
Total contribution of COs to POs Weightage	**27**	**25**	**17**	**15**	**9**	**6**	**5**
Weight Percentage of COs contribution to POs	**1.98**	**2.27**	**1.87**	**1.94**	**2.34**	**1.86**	**2.07**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

UNIT I: POETRY **(8 Hours)**

1. The Bird Sanctuary - Sarojini Naidu
2. The Justice of the Peace – Hilaire Belloc
3. The Pulley - George Herbert

UNIT II: PROSE **(9 Hours)**

1. I Won't let him go –Madhavan Kutty
2. A Little Bit of What You Fancy - Desmond Morris
3. Character is Destiny – Dr.S. Radhakrishnan

UNIT III: SHORT STORIES **(9 Hours)**

1. An Astrologer's Day – R.K.Narayan
2. Valiant Vicky – Flora Annie Steel
3. The Nightingale and the rose- Oscar Wilde

UNIT IV: ONE-ACT PLAY **(10 Hours)**

1. The Bishop's Candlesticks – Norman McKinnel
2. The Count's Revenge - J.H. Walsh

UNIT V: GRAMMAR AND COMPOSITION **(12 Hours)**

1. Framing Questions
2. Resume Writing
3. Agenda & Minutes

TEXT BOOK: MODERN VOICES

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:XII	24AMU12	PROGRAMMING IN R	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
II	IV	25	75	100

PREAMBLE:

To expose the students the fundamental concepts of R Programming.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Explain the importance of R Programming Languages	**K1**
CO2	Understand the basics in R programming in terms of constructs, control statements, String functions	**K2**
CO3	Understand the use of R for Big Data analytics	**K3**
CO4	Apply R programming for Text processing	**K4**
CO5	Appreciate and apply the R programming from a Statistical perspective	**K5**

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

CO – PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	3	3
CO4	9	3	9	9	3	3	1
CO5	9	3	9	3	3	3	1
Total Contribution Of COs to POs	45	33	45	39	33	27	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.78	2.59	2.82	2.54	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and Pos

COURSE CONTENT

UNIT- I INTRODUCTION TO R (14 Hours)

Introducing to R – R Data Structures – Help Functions in R – Vectors – Scalars – Declarations – Recycling – Common Vector Operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorized if-then-else – Vector Element names.

UNIT- II MATRICES (14 Hours)

Creating matrices – Matrix Operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns - Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.

UNIT- III DATA FRAMES (15 Hours)

Creating Data Frames – Matrix-like operations in frames – merging Data frames – Applying functions to Data Frames – Factors and Tables – Factors and levels – Common Functions used with factors – Working with tables – Other factors and table related functions – Control statements – Arithmetic and Boolean operators and values – Default Values for arguments – Returning Boolean Values – Functions are objects – Environment and scope issues – Writing Upstairs – Recursion – Replacement functions – Tools for Composing function code – Math and Simulation in R.

UNIT- IV CLASSES (15 Hours)

S3 Classes – S4 Classes – Managing your objects – Input/output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving Graphs to files – Creating Three-Dimensional plots.

UNIT- V INTERFACING R (14 Hours)

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear Models – Time Series and Auto-Correlation – Clustering

TEXTBOOK(S):

1. Norman Matloff, ―The Art of R Programming: A Tour of Statistical Software Design‖, No Starch Press, 2011.
2. Jared P. Lander, ―R for Everyone: Advanced Analytics and Graphics‖, Addison-Wesley Data & Analytics Series, 2013.

REFERENCE BOOK(S):

1. Mark Gardner, ―Beginning R – The Statistical Programming Language‖, Wiley, 2013.
2. Robert Knell, ―Introductory R: A Beginner‘s Guide to Data Visualisation, Statistical Analysis and programming in R‖, Amazon Digital South Asia Services Inc, 2013.
3. Richard Cotton (2013). Learning R, O‘Reilly Media. Garret Grolemund (2014).
4. Hands-on Programming with R. O‘Reilly Media, Inc. Roger D. Peng (2018). R Programming for Data Science. Lean Publishing.

WEB REFERENCES:

1. https://www.w3schools.com/r
2. https://www.programiz.com/r/matrix
3. https://www.javatpoint.com/r-tutorial
4. https://youtu.be/-qDiqnEVaLk?si=zRH9YTSBCshfa2Uq
5. https://youtu.be/hW7WD9DyDXs?si=J-5HCMSoD7tqXZmR

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:XIII PRACTICAL : V	24AMU13	PROGRAMMING IN R - PRACTICAL	60	4

Contact hours per week:5

Year	Semester	Internal Marks	External Marks	Total Marks
II	IV	40	60	100

PREAMBLE:

To embark the knowledge in students about fundamental concepts of R Programming.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Analyse the importance of R Programming Languages	**K1**
CO2	Apply the basic concepts in R programming in terms of constructs, control statements, String functions	**K2**
CO3	Classify the use of R for Big Data analytics	**K3**
CO4	Apply R programming for Text processing	**K4**
CO5	Develop the R programming from a statistical perspective	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	3	3
CO4	9	3	9	9	3	3	1
CO5	9	3	9	3	3	3	1
Total Contribution of COs to POs	45	33	45	39	33	27	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.78	2.59	2.82	2.54	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and Pos

PRACTICAL LIST

1. R Expressions and Data Structures
2. Manipulation of vectors and matrix
3. Operators on Factors in R
4. Data Frames in R
5. Lists and Operators
6. Working with looping statements
7. Graphs in R
8. 3D plots in R

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART:III	CORE:XIV ALLIED:IV	24AMU14	INTERNET OF THINGS	72	5

Contact Hours Per Week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
II	IV	25	75	100

PREAMBLE:

This course gives an overview of the basic concepts of building an IoT system and its application in Industrial 4.0

COURSE OUTCOME:

On successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Recall the general concepts of Internet of Things (IoT)	**K1**
CO2	Illustrate various IoT sensors and applications	**K2**
CO3	Apply design concepts to IoT solutions for Industrial 4.0	**K3**
CO4	Compare various IoT architectures	**K4**
CO5	Evaluate Design issue in IoT applications	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	3	3
CO5	9	3	3	3	3	3	1
Total Contribution of COs to POs	45	39	39	39	39	33	31
Weighted Percentage Of COs Contribution to POs	2.49	2.86	2.41	2.59	3.33	3.11	2.93

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I **IoT Principles** **(12 Hours)**

Introduction to IoT: Internet of things – Architectural Views and Architecture Design Principles – Needed Capabilities – IoT Applications. Design Principles for Connected Devices: Sensing – Basics of Networking – M2M/IoT Technology Fundamentals – Devices and Gateways and Data Management.

UNIT -II **IoT Communication** **(12 Hours)**

Business Processes, XaaS Cloud and Security: Business Process in IoT – XaaS Cloud Services – Role of Cloud in IoT – Security Aspects in IoT. Arduino – Raspberry Pi – Communication – Sensing, Actuation, and I/O Interfaces.

UNIT- III **IoT APIs** **(12 Hours)**

Programming APIs for M2M/IoT Applications: Programming in API – MQTT – ZigBee and Bluetooth Devices Network APIs – CoAP, UDP and TCP clients.

UNIT- IV **IoT Application Framework** **(12 Hours)**

IoT Application Development Framework: Solution Framework for IoT Applications – Implementation of Device Integration – Device Data Storage – Authentication and authorization of Devices – IoT Case Studies in Industry – Transportation - Healthcare – Home Automation and Agriculture.

UNIT- V **IoT Cloud offerings** **(12 Hours)**

Cloud Storage Models and Communication APIs – WAMP-Xively Cloud - Amazon Web Services for IoT - Various Real-Time Applications of IoT. - Industrial IoT.

TEXTBOOK(S):

1. Raj Kamal, "Internet of Things Architecture and Design Principles", Tata Mc Graw Hill Publications, second Edition.
2. Arshdeep Bahga, Vijay Madisetti, Internet of Things – A hands-on approach, Universities Press, 2015.

REFERENCE BOOK(S):

1. Marco Schwartz, Internet of Things with the Arduino Yun, Packt Publishing, 2014.
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, ISBN: 978-1-118-43062-0, Wiley, November 2013

WEB REFERENCES:

1. https://www.oracle.com/in/internet-of-things/what-is-iot/
2. https://www.youtube.com/watch?v=uLbtexcw39Y
3. https://www.ibm.com/blogs/internet-of-things/what-is-the-iot/
4. https://www.youtube.com/watch?v=h0gWfVCSGQQ
5. https://www.techtarget.com/iotagenda/definition/Industrial-Internet-of-Things-IIoT

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART:IV	SKILL ENHANCEMENT :I	24SEAMU01	INTERNET OF THINGS - PRACTICAL	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
II	IV	50	-	50

PREAMBLE:

This course gives an overview of the basic concepts of building an IoT system and its application in Industrial 4.0

COURSE OUTCOME:

On the successful completion of the course, students will be able to:

COs	CO Statement	Knowledge Level
CO1	Evoke the architecture of Internet of Things (IoT)	**K1**
CO2	Working on various IoT sensors and applications	**K2**
CO3	Applying APIs for IoT	**K3**
CO4	Developing the framework of IoT sensors and devices	**K4**
CO5	Developing real-time applications	**K5**

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

CO-POMAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	3	3
CO5	9	3	3	3	3	3	1
Total Contribution of COs to POs	45	39	39	39	39	33	31
Weighted Percentage Of COs Contribution to POs	2.49	3.30	2.78	2.99	1.79	1.98	1.98

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

PRACTICAL LIST

1.Controlling the Light Emitting Diode (LED) with a push button

2.Interfacing the RGB LED with the Arduino

3.Controlling the LED blink rate with the potentiometer interfacing with Arduino

4.Detection of the light using photo resistor

5.Interfacing of temperature sensor LM35 with Arduino

6. Interfacing Servo Motor with the Arduino

7.Interfacing of the Active Buzzer with Arduino.

8.Interfacing of the Relay with Arduino

9.Building Intrusion Detection System with Arduino and Ultrasonic Sensor

10.Directional Control of the DC motor using Arduino

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	ABILITY ENHANCEMENT:II	24AEU02	CONSUMER RIGHTS	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
II	IV	50	-	50

PREAMBLE:

This course seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.

COURSE OUTCOME:

On the successful completion of the course, students will be able to:

COs	CO Statement	Knowledge Level
CO1	Memorize the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards	**K1**
CO2	Explain the Consumer Protection Law in India	**K2**
CO3	Impart sound practical grounding about the practice of consumer law and the procedure Followed	**K3**
CO4	Evaluate the regulations and legal actions that helps To protect consumers	**K4**
CO5	Analyze the knowledge and skills needed for a career In this field	**K5**

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

CO-POMAPPING(COURSE ARTICULATION MATRIX)

POs /COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	1	0	1
CO2	9	9	9	9	1	0	1
CO3	9	9	9	3	3	1	1
CO4	9	3	1	1	3	3	3
CO5	9	1	3	0	9	9	9
Total Contribution of COs to POs	45	31	31	22	17	13	15
Weighted Percentage Of COs Contribution to POs.	2.49	2.27	1.92	1.46	1.45	1.23	1.42

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSECONTENT

UNIT- I Conceptual Framework (5 Hours)

Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing **Dissatisfaction:** Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behavior: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite.

UNIT- II The Consumer Protection Law in India (5 Hours)

Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defecting goods, spurious goods and services, service, deficiency in service, unfair trade practice, and restrictive trade practice. Organizational set-up under the Consumer Protection Act: **Advisory Bodies**: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, and National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT- III

Grievance Redressal Mechanism under the Indian Consumer Protection Law (5 Hours)

Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal; Offences and penalties. Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT- IV Role of Industry Regulators in Consumer Protection (5 Hours)

Banking: RBI and Banking Ombudsman Insurance: IRDA and Insurance Ombudsman Telecommunication: TRAI Food Products: FSSAI Electricity Supply: Electricity Regulatory Commission Real Estate Regulatory Authority

UNIT- V Contemporary Issues in Consumer Affairs (4 Hours)

Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings. Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified

SUGGESTED READINGS:

1. Khanna, SriRam, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007)
2. Consumer Affairs, Universities Press. Choudhary, Ram Naresh Prasad (2005).
3. Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd. G. Ganesan and M. Sumathy. (2012).
4. Globalization and Consumerism: Issues and Challenges, Regal Publications Suresh Misra and Sapna Chadah (2012).
5. Consumer Protection in India: Issues and Concerns, IIPA, New Delhi Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company Girimaji, Pushpa (2002).
6. Consumer Right for Everyone Penguin Books. E-books: - www.consumereducation.in Empowering Consumers e-book, ebook, www.consumeraffairs.nic.in The Consumer Protection Act, 1986 and its later versions. www.bis.org
7. Articles Misra Suresh, (Aug 2017) "Is the Indian Consumer Protected? One India One People. Raman Mittal, Sonkar Sumit and Parineet Kaur (2016)
8. Regulating Unfair Trade Practices: An Analysis of the Past and Present Indian Legislative Models, Journal of Consumer Policy. Chakravarthy, S. (2014).
9. MRTP Act metamorphoses into Competition Act. CUTS Institute for Regulation and Competition position paper. Available online at www.cuts-international.org/doc01.doc. Kapoor Sheetal (2013)
10. "Banking and the Consumer" Akademos (ISSN 2231-0584) Bhatt K.N., Misra Suresh and Chadah Sapna (2010).
11. Consumer, Consumerism and Consumer Protection, Abhijeet Publications. Kapoor Sheetal (2010)
12. "Advertising-An Essential Part of Consumer's Life-Its Legal and Ethical Aspects", Consumer Protection and Trade Practices Journal, October 2010.
13. Verma, D.P.S. (2002).
14. Regulating Misleading Advertisements, Legal Provisions and Institutional Framework. Vikalpa. Vol. 26. No. 2. pp. 51-57.
15. Periodicals Consumer Protection Judgments (CPJ) (Relevant cases reported in various issues) Recent issues of magazines: International Journal on consumer law and practice, National Law School of India University, Bengaluru 'Consumer Voice', Published by VOICE Society, New Delhi.

WEBSITES:

1. www.ncdrc.nic.in
2. www.consumeraffairs.nic.in
3. www.iso.org.
4. www.bis.org.in
5. www.consumereducation.in
6. www.consumervoice.in www.fssai.gov.in
7. www.cercindia.org

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE :XV	24AMU15	MACHINE LEARNING TECHNIQUES	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

To introduce students to the concepts and techniques of Machine Learning.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand the basic concepts and techniques of Machine Learning.	**K1**
CO2	Explain the regression methods, classification methods, clustering methods.	**K2**
CO3	Understand the inference and learning algorithms for the hidden Markov model.	**K3**
CO4	Demonstrate Dimensionality reduction Techniques.	**K4**
CO5	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning.	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	3	3
CO3	9	3	9	9	9	3	3
CO4	9	1	9	9	3	3	3
CO5	9	1	3	3	3	1	1
Total contribution of COs to POs	45	23	39	39	33	19	19
Weighted Percentage COs Contribution to POs	2.49	1.68	2.41	2.59	2.82	1.79	1.80

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I Introduction to Machine Learning (14 Hours)

Introduction – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search - Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT- II Machine Learning Models (15 Hours)

Linear Models – Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-Layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

UNIT- III Tree & Probabilistic Model (15 Hours)

Tree and Probabilistic Models – Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers - Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – Kmeans Algorithms – Vector Quantization – Self Organizing Feature Map.

UNIT- IV Dimensionality Reduction and Evolutionary Models (14 Hours)

Dimensionality Reduction and Evolutionary Models - Dimensionality Reduction – Linear Discriminant Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic Algorithms – Genetic Offspring – Genetic Operators – Using Genetic Algorithms – Reinforcements Learning – Overview – Getting Lost Example – Markov Decision Process.

UNIT- V Graphical Model (14 Hours)

Graphical Models – Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods.

TEXTBOOK(S):

1. Ethem Alpaydin, - Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

REFERENCE BOOK(S):

1. Jason Bell, - Machine Learning – Hands on for Developers and Technical professionals, First Edition, Wiley, 2014.
2. Peter Flach, - Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

WEB REFERENCES:

1. https://www.geeksforgeeks.org/introduction-machine-learning/
2. https://www.javatpoint.com/machine-learning-models
3. https://youtu.be/f_0d6ybv16c?feature=shared
4. https://towardsdatascience.com/introduction-to-evolutionary-algorithms-a8594b484ac
5. https://jonathan-hui.medium.com/machine-learning-graphical-model-b68b0c27a749

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE: XVI PRACTICAL : VI	24AMU16	MACHINE L EARNING -PRACTICAL	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	40	60	100

PREAMBLE:

To introduce students to the concepts and techniques of Machine Learning.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Gain knowledge about basic concepts of data sets	K1
CO2	Classify machine learning techniques based on training and testing data.	K2
CO3	Apply suitable machine learning techniques for various applications.	K3
CO4	Compare various supervised and unsupervised learning algorithms.	K4
CO5	Develop the techniques for real-time applications and find results	K5

K1–Remember;K2 –Understand;K3–Apply;K4 –Analyze;K5 –Evaluate;K6 –Create.

CO-PO MAPPING(COURSE ARTICULATIONMATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	3	3
CO3	9	3	9	9	9	3	3
CO4	9	1	9	9	3	3	3
CO5	9	1	3	3	3	1	1
Total contribution Of COs to POs	45	23	39	39	33	19	19
Weighted Percentage COs Contribution To POs	2.49	1.68	2.41	2.59	2.82	1.79	1.80

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation;
9-High correlation between COs and POs.

PRACTICAL LIST

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate datasets.
5. Write a program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test datasets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your dataset.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:XVII	24AMU17	DATA MINING AND WAREHOUSING	72	4

Contact Hours per Week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
III	**V**	**25**	**75**	**100**

PREAMBLE:
To Learn the concepts of data organization and mining

COURSE OUTCOME:
On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Remember the thrust areas of data processing	**K1**
CO2	Recall the various types of data and its architectural strategies	**K2**
CO3	Discuss the types of mining the data	**K3**
CO4	Analyze the cluster techniques with algorithms	**K4**
CO5	Categorize the other mining techniques used in data learning.	**K5**

K1–Remember;K2– Understand;K3–Apply;K4– Analyse;K5–Evaluate.

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	3	9	9	9	3	3
CO4	9	3	9	9	9	3	1
CO5	9	1	9	3	3	1	1
Total Contribution of COs to POs	45	25	45	39	39	25	23
Weighted Percentage of COs Contribution to POs	2.49	1.83	2.78	2.59	3.33	2.36	2.17

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation;

9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I Data Warehousing: An Introduction (12 Hours)

Introduction: Characteristics of a Data Warehouse-Data Marts-Other Aspects of Data Mart; Online Analytical processing: Introduction-OLTP and OLAP Systems-Data Modeling-Star Schema for Multidimensional View – Data Modeling- Multifact Star Schema –OLAP Tools-State of the Market-OLAP Tools and the Internet.

UNIT- II Developing a Data Warehouse (15 Hours)

Why and how to build a data warehouse-Data warehouse Architectural Strategies and Organizational Issues-Design Considerations-Data Content-Metadata-Distributions of data-Tools for Data Warehousing-Performance Considerations-Crucial Decisions in Designing in Designing a Data Warehouse; Applications of Data Warehousing and Data Mining in Government: Introduction- National Data Warehouse-Other Areas for Data Warehousing and Data Mining.

UNIT- III Data Mining (15 Hours)

Introduction- What is Data Mining-Data Mining: Definitions-DM Techniques; Association rules: Introduction- What is Association Rule-Methods to Discover Association Rules-A Priori Algorithm—Partition Algorithm-Pincer Algorithm-Dynamic Itemset Counting Algorithm-FP-tree Growth Algorithm-Discussion on Different Algorithms-Association Rules with Item constraints.

UNIT- IV Clustering Techniques (15 Hours)

Introduction-Clustering Paradigms-Partition Algorithms-k-Medoid Algorithms-CLARA-CLARANS-Hierarchical Clustering-DBSCAN-BIRCH-CURE;Decision Trees : What is a Decision Tree-Tree Construction Principle-Decision Tree Construction Algorithm- CART-ID-Pruning technique.

UNIT -V Other Techniques (15 Hours)

Introduction – What is a Neural Network - Learning in NN-Unsupervised learning-Data Mining using NN:a case study-Genetic Algorithm;Web Mining: Introduction- Web Mining-Web Content Mining- Web Structure Mining-Web Usage Mining-Text Mining-Text Clustering.

TEXT BOOK:

1. C.S.R. Prabhu, Data Warehousing –Concepts,Techniques,Products and Applications,2nd edition,Prentice-Hall of India Private Limited,2006.
2. Arun K Pujari, Data Mining Techniques, Universities Press(India) Private Limited 2001.

REFERENCE BOOKS:

1.Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining" 2nd Edition Pearson,2006.
2. W. H. Inmon, "Building the Data Warehouse" 4th Edition, Wiley,2005.

WEB REFERENCE:

1. https://www.javatpoint.com/data-mining

2.https://www.guru99.com/data-mining-tutorial.html

3. https://www.geeksforgeeks.org/introduction-to-data-mining/

4. https://www.ibm.com/docs/en/db2/10.5?topic=tutorials-mining-tutorial

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	Core : XVIII	24AMU18A/ 24AMU18B/ 24AMU18C	Institutional Training/ Industrial Training/ Mini Project	-	1

Contact Hours per Week: Nil

Year	Semester	Internal Marks	External Marks	Total Marks
III	**V**	**100**	**-**	**100**

PREAMBLE:
To expose the students to practice themselves and find solutions to problems in their respective area.

COURSE OUTCOME:
On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Remember the thrust areas of the project.	**K1**
CO2	Demonstrate the problems pertaining to the domain.	**K2**
CO3	Apply various algorithms in their relevant field.	**K3**
CO4	Explore the real-time applications.	**K4**
CO5	Evaluate demographic variables and factors influencing software development.	**K5**

K1–Remember; K2– Understand; K3–Apply; K4– Analyse; K5–Evaluate.

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	9	9
CO5	9	9	9	9	9	9	9
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**45**	**45**
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

Category	Components	Course Code	Course Title	Contact Hours	Credit
PART: III	CORE: XVII OPEN ELECTIVE COURSE	24TAUOE1	திறன் மேம்பாட்டு கல்வி	48	2

Contact hours per week : 4

Year	Semester	Internal Mark	External Marks	Total Marks
III	**V**	**25**	**75**	**100**

முகப்புரை:

தனிதிறன் மேலாண்மையையும் செயல்பாட்டினையும் வளர்கும் முறையினை அறிவர்.

COURSE OUTCOME :

தனிதிறன் அறிவினைக் கற்பதன் மூலம் கீழ்க்காணும் நிலையை அடைவர்.

COs	CO Statement	Knowledge Level
CO1	பேசுதல், எழுதுதல், தொடர்புகொள்ளுதல் ஆகியவற்றைக் குறித்து அறிந்து கொள்வர்.	K1
CO2	திட்டமிடல், செயல்படுத்துதல் ஆகியவ்றறை கற்பர்.	K2
CO3	நேர மேலாண்மை, குழு கலந்துரையாடல், நேர்காணல் செய்தல் போன்றவற்றில் திறம்பட செயலாற்றுவர்.	K3
CO4	தனிநபர் செயல்பாடு, ஆக்கத்திறன், தனிமனித விழுமியங்கள் ஆகியவற்றை பகுத்து ஆராய்வர்.	K4
CO5	தன்னப்பிக்கை, ஊக்கம், முயற்சி, நேர்மறை சிந்தனை, மக்கள் தொடர்பு ஆகியவற்றை உணர்ந்து மதிப்பிடுவர்	K5

K1: Remember Level , K2:UnderstandLevel , K3: Apply Level , K4: Analyze Level, K5: Evaluate Level

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	3	3	9	9	9
CO2	9	9	9	9	9	3	3
CO3	9	3	9	9	9	9	9
CO4	9	3	3	9	3	9	9
CO5	9	9	9	9	9	9	9
Total contribution of COs to POs Weightage	45	33	33	39	39	39	39
Weight Percentage of COs contribution to POs	**2.29**	**2.09**	**2.08**	**2.48**	**3.24**	**3.22**	**3.60**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

அலகு -1 **10 மணி**

ஆளுமைத் திறன் மேம்பா தலைமைப் பண்பு, பேசுதல், எழுதல், தொடர்பு கொள்ளுதல், குழு செயல்பாடு, தனிநபர் செயல்பாட்டு விளக்கம்.

அலகு-2 **9 மணி**

செயல் திறன் மேம்பாடு திட்டம் அமைத்தல், செயல்படுத்துதல், இடர்பாடுகள், செயலாக்கம்

அலகு-3 **10 மணி**

நேர்காணல்நேர மேலாண்மை, செயல்படுத்துதல், முன்தயாரிப்பு, உடல் அசைவு மொழிகள், குழு கலந்துரையாடல், அறிமுக நிகழ்வு, இன்றைய தகவல்கள் குறித்த விழிப்புணர்வு

அலகு-4 **10 மணி**

உணர்வு மேலாண்மைதனிநபர் செயல்பாடு, ஆக்கத்திறன், தனி மனித விழிமியங்கள், வெற்றி உன் கையில்

அலகு -5 **9 மணி**

உன்னை நீ அறிவாய்தன்னம்பிக்கை, ஊக்குவித்தல், முயற்சி, நேர்மையான சிந்தனை, மக்களுடன் தொடர்பு கொளளுதல்

பாட நூல்கள்:

ஆளுமைத் திறன், பாதை தெரியுது பார், நெல்லைகவினேசன், தினத்தந்தி வெளியீடு,

பார்வை நூல்கள் :

1.சாதிக்க ஆசைப்படு, டாக்டர் சே.சைலேந்திரபாபு, சுரா பதிப்பகம், அண்ணா நகர், சென்னை

2. நேர்முகத் தேர்வை எதிர்கொள்வது எப்படி?, சே.ஆனந்த முருகன், சிவம் புத்தகாலயம், சென்னை

3. முடியும் என்றால் முடியும், ரவி பாரதி, நர்மதா பதிப்பகம், தி.நகர், சென்னை.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART: III	CORE :XVII OPEN ELECTIVE	24ENUOE1	ENGLISH FOR EFFECTIVE COMMUNICATION	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	**V**	**25**	**75**	**100**

PREAMBLE:

To focus the theory and fundamental tools of communication and various dimensions of communication skills.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Define the verbal and Non-Verbal Communication	**K1**
CO2	Explain the practice in four modes of literacy.	**K2**
CO3	Make use of appropriate Verbal and Non Verbal signs for effective communication.	**K3**
CO4	Examine the primary academic writing associated with the communication.	**K4**
CO5	Assess the communicative competencies such as managing conflict, understanding group processes, active listening, appreciate self-disclosure ,etc..	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	3	3	3	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	0	0
CO5	3	3	3	1	0	0	0
Total contribution of COs to POs Weightage	**39**	**33**	**27**	**17**	**10**	**7**	**5**
Weight Percentage of COs contribution to POs	**2.86**	**3.00**	**2.97**	**2.20**	**2.60**	**2.17**	**2.07**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

UNIT I : Aspects Of Communication (9 Hours)

1. Communication through Words
2. Communication through Body Language
3. Communication through Technology

UNIT II : **Oral Communication** (**10 Hours)**

1. Dyadic communication
2. Active listening
3. Meetings
4. Seminars and conferences
5. Group discussions

UNIT III : Written Communication (10 Hours)

1. Reading Comprehension
2. Précis writing
3. Business and Technical Reports
4. Style
5. Technical Proposals

UNIT IV : Written Communication (10 Hours)

1. Memorandum Writing
2. Notice, Agenda, Minutes
3. Handbooks and Manuals
4. Research Papers and Articles
5. Advertising and Job Description

UNIT V : Mechanics Of Manuscript Preparation (9 Hours)

1. Editing and Proofreading
2. Copy Editing
3. Punctuation and Capitalization
4. Abbreviations and Numerals

TEXT BOOK:

Developing Communication Skills by Krishna Mohan &Meera Banerji

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credits
PART- III	CORE –XVIII OPEN ELECTIVE	24MAUOE1	MATHEMATICS FOR BUSINESS	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

To enable the students to learn Business Mathematics.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of sequence and series ,matrix, set theory, simple interest and compound interest.	**K1**
CO2	interpret sequence and series ,matrix, set theory, simple interest and compound interest.	**K2**
CO3	apply different quantitative models in solving business problems	**K3**
CO4	determine the solutions of the problems based on matrix , simple interest and compound interest problems	**K4**
CO5	evaluate the problems on sequence and series ,matrix, set theory, simple interest and compound interest problems.	**K5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	3	3	3	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	0	0
CO5	3	3	3	1	0	0	0
Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs contribution to POs	2.24	2.08	1.82	1.24	1.18	0.92	0.73

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT

UNIT - I **SERIES** **(10 Hours)**

Sequence and series - Arithmetic progression –Geometric progression – Arithmetic mean - Geometric mean – Harmonic mean.

UNIT - II **MATRICES** **(6 Hours)**

Fundamental ideas about Matrices and their operational rules- Matrix Multiplication- Inverse of a matrix.

UNIT - III **SET THEORY** **(6 Hours)**

Introduction- Types of sets- Set operation- Venn diagrams, Inconsistency of data.

UNIT - IV **MATHEMATICS OF FINANCE** **(7 Hours)**

Simple Interest.

UNIT - V **MATHEMATICS OF FINANCE** **(7 Hours)**

Compound Interest.

NOTE: No derivation and proof, simple problems only.

TEXT BOOK

Navnitham P.A (2012) – "Business Mathematics and Statistics", Sultan Chand & Sons, New Delhi.

UNIT	CHAPTER	PAGE
I	1	1 -33.
II	4	147-184.
III	3	104-136.
IV	2	43-51.
V	2	51-61.

REFERENCE BOOK:

Vittal.P.R (2002) - "Business Mathematics and Statistics, Margham publishers, Chennai.

WEB REFERENCES:

1. http://www.mim.ac.mw/books/Business%20mathematics%20and%20statistics,%206th%20ed.pdf
2. https://en.wikipedia.org/wiki/Business_mathematics
3. https://youtu.be/pn2Fx9-G1Ds

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credits
PART – III	CORE: XVII OPEN ELECTIVE	24PHUOE1	**PHYSICS IN DAY TO DAY LIFE**	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE: To demonstrate knowledge and understanding of the fundamental concepts in Physics

COURSE OUTCOME: After completion of the course, the learners will be able to

COs	Course Statement	Knowledge Level
CO1	Identify the measurements, Electric Current, Electricity, Magnetism, Electrolysis, Magnetic field effect and Natural Phenomena's in Atmosphere	**K1**
CO2	Explain the concepts in Electricity, standard units and Types of Motion, Electric power, Effects of current and Magnet, lightning, thunder, water harvesting, coal and petroleum	**K2**
CO3	Perform different SI units in measurement, electricity and magnetism, electric potential, resistance, chemical effect of Electric current and magnetism	**K3**
CO4	Criticize the measurements of different units, Electricity, Resistance, associate reaction of magnetic Poles, Protection against natural calamities,	**K4**
CO5	Interpret the measuring, electric current, Laws in Physics, electricity and magnetism, Natural Resources	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	1
CO2	9	9	9	3	3	1	1
CO3	9	9	3	3	2	1	1
CO4	9	3	3	1	1	1	1
CO5	3	3	3	1	1	1	1
Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs Contribution to POs	2.25	2.17	1.96	1.47	1.12	0.98	0.70

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT- I - Motion and Measurements of Distances **(10 Hours)**

History of Transportation-Measurement of Length – Distance-Conventional Methods of Measurement-Standard Units of Measurement-Types of Motion

UNIT- II - Electricity **(10 Hours)**

Electric current-Electric circuit-Components of basic electric circuit: Cell, Switch, and Bulb Conductor-Insulator-Electric potential and potential difference-Circuit diagram-Ohm's law Factors on which the resistance of conductor depends-Resistance of a system of resistors-Heating effect of electric current-Electric power

UNIT- III - Chemical Effects of Electric Current and Magnetism **(10 Hours)**

Conduction of Electricity-Conduction of Electricity in Liquids – Electrolysis-Electrolysis and Electroplating - Discovery of Magnets-Magnet-Poles of a magnet-Like poles repel and unlike poles attract Magnetic Field of Earth and Compass

UNIT- IV - Some Natural Phenomena **(9 Hours)**

Lightning-Charging by rubbing-Transfer of Charge-The Story of Lightning-Lightning Safety Phenomena related to earthquakes-Protection against earthquakes

UNIT- V - Management of Natural Resources **(9 Hours)**

Save the Environment from Environmental Pollution – Reuse– Recycle-Why do we need to manage our natural resources-Forest and wildlife-Sustainable management-Water for all : dam-Water harvesting-Coal and petroleum

Reference Book

Monograph – Department of Physics

Web reference

1. https://www.researchgate.net/publication/277130091_Energy_Resources_Indian_Scenario
2. https://www.aps.edu/energy-conservation/energy-lessons-and-games/energy-lessons-and-games/26_HS-IssueOfRenewableEnergy.pdf
3. https://ncert.nic.in/textbook/pdf/hesc114.pdf
4. https://www.learncbse.in/motion-and-measurement-of-distances-class-6-notes/
5. https://web.njit.edu/~vitaly/121/notes121.pdf

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credits
PART – III	CORE: XIX (OPEN ELECTIVE)	24CGUOE1	BASICS OF ACCOUNTING	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	**V**	**25**	**75**	**100**

PREAMBLE (For Other Major Students)

To equip the students with the fundamental principles of accountancy for sole tradingconcerns

COURSE OUTCOME

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Acquire the knowledge in accounting, system of maintenance of accounts, journal, ledger and different types of subsidiary books.	**K1**
CO2	Familiarise the concept of accounting equation, types of accounts, golden rules of accounting, trial balance and final accounts.	**K2**
CO3	Develop the application skills in preparation of ledger accounts and final accounts.	**K3**
CO4	Analyse the assets and liabilities in the balance sheet.	**K4**
CO5	Evaluate the financial position of a business.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	1
CO2	9	9	9	3	3	1	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	1	1
CO5	3	3	3	1	0	1	1
Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs Contribution to POs	2.09	2.07	1.68	2.00	0.92	0.42	1.07

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

UNIT- I **(10 Hours)**

Introduction to Accounting: Accounting – meaning and definition – need – steps – objectives – advantages – limitations – users of accounting information – book keeping Vs accounting – double entry system – dual aspects – advantages of double entry system – types of accounts – personal account, real account and nominal account – golden rules of accounting – accounting terms – accounting equation – accounting cycle.

UNIT- II **(10 Hours)**

Journal and Ledger: Journal – meaning and definition – format – recording business transactions in journal with narration. Ledger - meaning and definition – format – posting journal entries in ledger.

UNIT- III ` (10 Hours)

Subsidiary Books: Meaning – benefits – types – purchase book, sales book, purchase return book, sales return book, bills receivable book, bills payable book, petty cash book and cash book with single,double and triple columns.

UNIT- IV **(10 Hours)**

Trial Balance: Meaning – objectives – methods of preparing trial balance – preparation of trial balance from the balances extracted from the ledger accounts – errors disclosed by trial balance – errors not disclosed by trial balance**)**

UNIT- V **(8 Hours)**

Final accounts: Introduction – preparation of trading account, profit and loss account and balance sheet with simple adjustments – closing stock, outstanding expenses, prepaid expenses, accrued income and income received in advance.

Note: Distribution of Marks: Theory- 40% and Problems- 60%.

TEXT BOOKS:

S.No	Authors	Title	Publisher	Year of Publication
1	Reddy.T.S & Murthy A	Financial Accounting	Margham Publication, Chennai	2012
2	Vinayakam.N, Mani.P.L & Nagarajan.K.L	Principles of Accountancy	S.Chand & Sons, New Delhi, New Delhi	2002

BOOKS FOR REFERENCE:

S.No	Authors	Title	Publishers	Year of Publication
1	Grewal.T.S	Introduction to Accountancy	S.Chand & Sons, New Delhi, New Delhi	2003
2	Gupta.R.L,Gupta,V.K & Shukla.M.C	Financial Accounting	S.Chand&Sons, NewDelhi	2009
3	Maheswari.S.K, Reddy.T.S	Advanced Accountancy	Vikas Publishing House, New Delhi.	1996

Power Point presentation, Quiz, Assignment, Experience Discussion, Brain Storming, Group Discussion,Seminars.

Category	Component	Course Code	Course Title	Contact Hours / Semester	Credit
PART – III	CORE : XIX OPEN ELECTIVE	24CCUOE1	E- ADVERTISING	65	2

Contact hours per week:4

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE : (For other major students)

To make the students to understand the concept of e-advertising tools and techniques in media

COURSE OUTCOME :

Upon Completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	spell out the meanings for the different terms used in E-advertising	**K1**
CO2	explain the various domain concepts in E-advertising	**K2**
CO3	apply the modern techniques of advertising in media planning, advertising agencies and social advertising	**K3**
CO4	analyse the role of creativity in advertising, factors influencing media choice, challenges faced by advertisers and distinguish between traditional advertising and E advertising	**K4**
CO5	evaluate the effectiveness of E-advertising to withstand the products in the market	**K5**

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

CO-PO MAPPING (COURSE ARTICUALTION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	1
CO2	9	9	9	3	3	1	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	1	1
CO5	3	3	3	1	0	1	1
Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs Contribution to POs	1.95	1.87	1.50	1.21	1.33	0.67	0.83

Level of Correlation: 0-No Correlation; 1-Low Correlation; 3-Medium Correlation; 9-High Correlation between COs and POs.

COURSE CONTENT

UNIT I **(13 hours)**

E-advertising

Meaning – Traditional advertising Vs E- advertising – Facets of E- advertising – Role of E-advertising- Models for E- advertising – Significance and limitations of E- advertising – Constraints in E- advertising.

UNIT-II **(13 hours)**

Creativity in advertising

Role of creativity in advertising - Determining the message theme / major selling idea and Unique selling Proposition (USP) - Positioning strategies - Persuasion Advertising appeal and its types – Executional styles of presenting ads- Advertising Copy-meaning, essentials and its elements– headline, sub-headline, body copy, illustration, slogan, signature and logo

UNIT-III **(13 hours)**

Media planning and Decisions

Media Planning-The function of media planning in advertising-Role of media Planner - Challenges in media planning -Media planning process -Major media types – characteristics of media- internet as an advertising media- merits and demerits- Factors influencing media choice- media selection- media scheduling- Advertising through the Internet-media devices.

UNIT IV **(13 hours)**

Effectiveness of E-advertising

Evaluating communication and sales effects- Pre- and Post-testing techniques- E-advertising agencies – selection, compensation and appraisal of advertising agency

UNIT V **(13 hours)**

E- advertising in Indian Scenario

Trends in advertising industry in India – Challenges faced by advertisers in India in the era of globalization- Social Advertising by Indian Government through Directorate of Advertising and Visual Publicity (DAVP)

TEXT BOOKS:

Authors	Title	Publisher	Year of Publication
Jaishree Jethwaney and Shruti Jain,	Advertising Management –	2nd Ed. Oxford University Press	2012
Ronald Lane,W. J. Thomas Russell, Karen Whitehill King	Kleppners Advertising Procedure	16th Ed., Pearson Education India	2008

BOOKS FOR REFERENCE:

S. No	Authors	Title	Publishers	Year of Publication
1.	Belch G. and Belch M.	Advertising and Promotion, An Integrated Marketing Communications Perspective	6th ed., Tata McGraw-Hill Publishing Company Limited, New Delhi, India	2003
2.	Burnett, Wells, and Moriatty	Advertising: Principles and Practice	5th ed. Prentice Hall of India New Delhi	2015
3.	Kazmi S. H. H. and Batra Satish K	Advertising and Sales Promotions	2nd ed., Excel Books, New Delhi,	2004

Power Point Presentation, Quiz, Assignment, Activity, Group Discussion, Seminars, Experience Discussion, Brain Storming.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART – III	CORE :XIX OPEN ELECTIVE	24CPUOE1	HUMAN RESOURCES MANAGEMENT	52	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	50	50	100

PREAMBLE

To make the students to understand the various facets of Human Resource Management and comprehend emerging developments in HRM.

COURSE OUTCOME:

After completion of the course, the learners will be able to

COs	CO Statement	Knowledge Level
CO1	recollect the concepts of Human Resource Management, Human resource planning, Recruitment, selection and placement, job analysis, training, performance appraisal, promotion, motivation	K1
CO2	illustrate the role of human resource manager, benefits of human resource planning, job description and job specification.	K2
CO3	apply the organizational set up of human resource department, methods of selection, job design and performance appraisal	K3
CO4	analyze the problems involved in placement, methods of training-techniques of wage fixation, styles of leadership	K4
CO5	evaluate the implications of human resource planning, need for training, measurements, motivation and leadership	K5

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

CO-PO MAPPING (COURSE ARTICUALTION MATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	1
CO2	9	9	9	3	3	1	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	1	1
CO5	3	3	3	1	0	1	1
Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs Contribution to POs	2.24	2.19	1.79	1.59	1.63	0.92	0.85

Level of Correlation: 0-No Correlation; 1-Low Correlation; 3-Medium Correlation; 9-High Correlation between COs and POs.

COURSE CONTENT

UNIT I **(10 Hours)**

Human Resource Management

Meaning of HRM- importance of HRM- objectives - Role of human resource manager- duties and responsibilities of human resource manager- typical organizational setup of human resource department.

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UNIT II **(10 Hours)**

Human Resources Planning

Meaning and importance of human resources planning- benefits of human resource planning- process of human resource planning- Recruitment- Selection- testing interview- Placement.

UNIT III **(10 Hours)**

Job Analysis

Concept and uses of job analysis- Process and methods of job analysis- Job description and job specification- Role analysis -Concept of job design- approach and methods of job design- Training and induction-meaning- Objectives and purpose of induction-need for training-benefits of training-methods of training

UNIT IV **(12 Hours)**

Performance Appraisal, Compensation and Promotion

Meaning of performance appraisal- Objectives of performance appraisal- methods of performance appraisal and limitations- job evaluation- Principles and techniques of wage fixation -Objectives of Compensation.

UNIT V **(10 Hours)**

Motivation and Leadership

Motivation-meaning-importance-factors influencing motivation and theories of motivation-Maslow's theory of motivation-Herzberg two factors hygiene theory of motivation-X,Y and Z theories

Leadership

Leadership: Meaning- Qualities and styles of leadership.

BOOKS FOR REFERENCE:

S.No	Authors	Title	Publishers	Year of Publication
1	Aswathappa K	Human Resource management	McGraw Hill Education; Eighth edition, New Delhi.	2017
2	Dessler, Gary	Human Resource management	Prentice Hill, New Delhi.	2014
3	Prasad L.M.	Human Resource Management	Sultan Chand & Sons, New Delhi	2007
4	Rao, S.	Personnel and human resource management	Himalaya publishing house, Bangalore	2014
5	Reddy &Appanniah	Human Resource management	Himalaya publishing house, New Delhi	
6	Tripathi P.C.	Human Resource Management	Sultan Chand & Sons, New Delhi	2010

WEB REFERENCES:

1) https://www.hrdconnect.com/2019/05/22/what-is-hr-management-in-an-organisation/
2) https://www.economicsdiscussion.net/human-resource-management/human-resource-planning-definition-importance-objectives-process-prerequisites/31575
3) https://www.economicsdiscussion.net/human-resource-management/job-analysis-meaning-concept-purposes-contents-process-and-methods/31576
4) https://www.economicsdiscussion.net/performance-appraisal/performance-appraisal-in-hrm/31873
5) https://www.toolbox.com/hr/talent-management/articles/what-is-talent-management/
6) https://www.businessmanagementideas.com/human-resources-management/work-life-balance-in-hrm/20853
7) https://www.slideshare.net/timadams2323/balanced-scorecard-presentation-1068670
8) https://www.slideshare.net/jithindas05/competency-mapping-ppt-15741755?next_slideshow=1

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credits
PART - III	CORE: XIX OPEN ELECTIVE	24BAUOE1	START-UP BUSINESS	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

The course is designed to understand the practices and technology to start a business.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Find out the start-up activities of a business.	K1
CO2	Demonstrate the trends and supporting agencies for starting a business.	K2
CO3	Build the importance of start-up ideas and map the strategies to start a business with different stages of business.	K3
CO4	Categorise the application of start up business activities	K4
CO5	Evaluate the ideologies of start-up business in real time scenario	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	0	0
CO2	9	9	9	3	3	1	1
CO3	9	9	3	3	0	3	1
CO4	9	3	3	1	3	0	3
CO5	3	3	3	1	1	3	0
Total Contribution of COs to POs	**39**	**33**	**27**	**17**	**10**	**7**	**5**
Weighted Percentage of COs Contribution to POs	**2.23**	**2.26**	**2.29**	**1.71**	**1.22**	**1.22**	**0.81**

Level of correlation: 0 – No correlation; 1- Low correlation; 3 – Medium correlation; 9 – High correlation between COs and POs

COURSE CONTENT

UNIT- I INTRODUCTION TO START-UP (10 Hours)

Start-up: Meaning- Difference between start-up idea and opportunity-Need for start-up-Qualities required for a start-up-Factors influencing start-up-Problems for start-up- Startup scenario in India.

UNIT -II MENTORING AND FUNDING FOR START-UP (10 Hours)

Ownership structure for start-up -Selection of mentors-Importance of start-up mentors Bootstrapping-Funding for start-up.

UNIT- III START-UP IDEAS AND MINDMAPPING (10 Hours)

Start-up ideas: Market-Focus Groups-Brainstorming-Gordon Method-Collective notebook method and Big dream approach-Mind mapping.

UNIT- IV LIFE CYCLE STAGES OF START-UP (10 Hours)

Life cycle stages of start-up's – Activities during each stage-Interaction with a start-up entrepreneur.

UNIT- V START-UP REGISTRATION & PRACTICAL TRAINING (8 Hours)

Student start-up's-Role of TBI in promoting start-up- Start-up registration process -overview of start-up marketing ideas.

BOOK FOR REFERENCE:

S. no	Authors	Title	Publishers	Year of publication
1.	Vijayakumar Ivaturi, Meena Ganesh	The manual for Indian start-ups	Penguin Random House India	2018

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XX ELECTIVE:I	24AMU19A	DEEP LEARNING-LEVEL 1	60	4

Contact Hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:
To introduce the basic concepts of Deep Learning and its techniques.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Define the concept of machine learning basics.	**K1**
CO2	Explain about the various learning algorithms.	**K2**
CO3	Discuss the deep networks and training models.	**K3**
CO4	Analyze convolution networks and sequence modeling.	**K4**
CO5	To know the practical approach of Deep Learning.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT 1 Deep Learning (12 Hours)

Artificial Intelligence, Machine Learning And Deep Learning-Research Domains And Industry Applications - Tools and Technologies-Getting A Perspective Of Deep Learning-Organization Of The Book-Necessary Mathematics For Deep Learning: Introduction-Linear Algebra - Statistics-Calculus.

UNIT 2 Deep Learning: A Step Forward Toward Artificial Intelligence (12 Hours)

Introduction-Their Neuroscience Inspiration For Convolutional Neural Networks- Deep Learning Vs Traditional Machine Learning- Deep Learning Networks: Current Practices-Application Areas With Big Impact Of The Planning- What's Next For Artificial Intelligence

UNIT 3 Fundamentals of Neural Network (12 Hours)

Introduction-Understanding The Biological Neuron- Exploring The Artificial Neuron-Early Implementations Of ANN- Types Of Activation Functions-Architectures Of Neural Network-Learning Process In Ann- Deep Neural Network.

UNIT 4 Training Deep Learning Networks (12 Hours)

Mini-Batch Gradient Decent And Adam Optimisation-Activation Functions-Initializing The Weight Parameters-Batch Normalization-Regularization-Log Loss (Metric ForAssessing Classification Accuracy And Its Optimisation

UNIT 5 Convolutional Neural Networks (12 Hours)

The Convolution And Correlation Operations-Layers In A Cnn-Building A Convolutional Neural Network Model-Convolutional Neural Networks With Rgb Image Data-Training A Convolutional Neural Network-And Unsupervised Representation Learning Using Deep Auto Encoders - Transfer Learning.

TEXTBOOK:

1. DEEP LEARNING by Amit Kumar Das,Saptarasi Gosw Ami,Pabitra Mitra and Amilan Chakrabarti, Published by Pearson India Education Services.
2. Deep Learning Core Concepts ,Methods and Applications by M.Gopal Published by Pearson India Education Services.

BOOK REFERENCES:

1. "Neural Networks and Deep Learning: A Textbook" by Charu C. Aggarwal, 1st Edition, 2018, Springer"Deep Learning for Computer Vision" by Rajalingappaa Shanmugamani, 1st Edition, 2019, Packt Publishing

WEB REFERENCE:

1. **https://www.kaggle.com/learn/intro-to-deep-learning**
2. **https://www.javatpoint.com/deep-learning**
3. https://www.datacamp.com/tutorial/tutorial-deep-learning-tutorial
4. https://www.w3schools.com/ai/ai_neural_networks.asp

Category	Course Type	Course Code	Course Title	Contact Hours	Credit
PART-III	CORE : XX ELECTIVE:I	24AMU19B	DATA SCIENCE – LEVEL 1	60	4

Contact Hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

To introduce the basic concepts of Deep Learning and its techniques.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Analyze the need for data processing and probability statistics.	**K1**
CO2	Explain about the databases used for data science.	**K2**
CO3	Discuss the methods in data analytics.	**K3**
CO4	Analyze the components and areas of text mining.	**K4**
CO5	Representation of text mining in the real world.	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I Introduction to Data Science (12 Hours)

Importance Of Data Science: Need For Data Science-What Is Data Science-Data Science Process-Business Intelligence And Data Science-Prerequisites For A Data Scientist-Components Of Data Science - Tools And Skills Needed; Statistics And Probability: Data Types-Variable Types-Statistics-Sampling Techniques And Probability-Information Gain And Entropy-Probability Theory-Probability Types-Probability Distribution Functions-Bayes Theorem-Inferential Statistics

UNIT- II Databases for Data Science (12 Hours)

Sql-Tool For Data Science: Basics Statistics With Sql-Data Munging With Sql-Filtering, Joints And Aggregation-Window Functions And Ordered Data-Preparing Data For Analytics Tool; Advanced Nosql For Data Science: Why Nosql-Document Databases For Data Science-Wide-Column Databases For Data Science-Graph Databases For Data Science.

UNIT- III Data Modeling And Analytics (12 Hours)

Data Science Methodology: Analytics For Data Science-Examples Of Data Analytics-Data Analytics Life Cycle ;Data Science Methods And Machine Learning: Preparation Analysis-Machine Learning-Summary

UNIT- IV Data Analytics And Text Mining (12 Hours)

Text Mining: Major Text Mining Areas- Text Analytics-Basic Text Analysis Steps; Introduction To Natural Language Processing: Major Components Of Nlp- Stages Of Nlp-Statistical Processing Of Natural Language-Applications Of Nlp.

UNIT- V Representing And Mining Text (12 Hours)

Why Text Is Important-Why Text Is Difficult-Representation-Example: Jazz Musicians-Beyond Back Of Words-Example: Mining New Stories To Predict Stock Price Movement.

TEXTBOOK:

1. Sanjeev J. Wagh, Manisha S. Bhende and Anuradha D.Thakare, “Fundamentals of Data Science”, CRC Press,
2. "Data Science for Business" by Foster Provost and Tom Fawcett was published in 2013 by O'Reilly Media.

BOOK REFERENCES:

1. "Data Science from Scratch" by Joel Grus, 1st Edition, 2015, O'Reilly Media
2. "Data Smart: Using Data Science to Transform Information into Insight" by John W. Foreman was published in 2013 by Wiley.

WEB REFERENCE:

1. https://www.w3schools.com/datascience/
2. https://www.simplilearn.com/tutorials/data-science-tutorial
3. https://intellipaat.com/blog/tutorial/data-science-tutorial/
4. https://www.tutorialspoint.com/data_science/index.htm

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XX ELECTIVE : I	24AMU19C	SOFTWARE AGENTS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

To explain the fundamentals of agents and agent programming paradigms and explain about agents and security

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understanding the fundamentals of agents and agent programming paradigms.	**K1**
CO2	Discussing the basics of java agents.	**K2**
CO3	Learning the concepts of multivalent systems.	**K3**
CO4	Understanding the concepts of intelligent software agents.	**K4**
CO5	Understanding the agents and security.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation;

9-High correlation between COs and POs

COURSE CONTENT

UNIT- I **Agents–Overview** **(12 Hours)**

Agent Definition–Agent Programming Paradigms–Agent Vs Object–Aglet–Mobile Agents–Agent Frameworks–Agent Reasoning

UNIT -II **Java Agents** **(12 Hours)**

Processes–Threads–Daemons–Components–JavaBeans–ActiveX–Sockets–RPCs–Distributed Computing–Aglets Programming–Jini Architecture–Actors and Agents–Typed and Proactive Messages

UNIT- III **Multi Agent System** **(12 Hours)**

Interaction between Agents–Reactive Agents–Cognitive Agents–Interaction Protocols–Agent Coordination–Agent negotiation–Agent Cooperation–Agent Organization–Self-InterestedAgents in Electronic Commerce Applications

UNIT- IV **Intelligent Software Agents** **(12 Hours)**

Interface Agents–Agent Communication Languages–Agent Knowledge Representation–AgentAdaptability–Belief Desire Intension–Mobile Agent Applications

UNIT -V **Agents and Security** **(12 Hours)**

Agent Security Issues– Mobile Agents Security–Protecting Agents against Malicious Hosts–Untrusted Agent – Black Box Security–Authentication for Agents–Security Issues for Aglets

TEXT BOOK(S):

1. Bigus&Bigus,―ConstructingIntelligentagentswithJava‖,Wiley,2010.
2. Bradshaw,–Software Agents‖,MITPress,2012.

REFERENCE BOOK(S):

1. Russel & Norvig, –Artificial Intelligence a modern approach‖, Prentice Hall, 1994.
2. Richard Murchand Tony Johnson, –Intelligent Software Agents‖, Prentice Hall, 2000.
3. Michael Wooldridge,– An Introduction to Multi Agent Systems‖, John Wiley, 2002.

WEB REFERENCES:

1. https://www.sce.carleton.ca/netmanage/docs/AgentsOverview/ao.html
2. https://www.aiforanyone.org/glossary/multi-agent-system
3. https://www.techtarget.com/searchenterpriseai/definition/agent-intelligent-agent
4. https://www.turing.ac.uk/research/interest-groups/multi-agent-systems
5. https://www.paloaltonetworks.com/cyberpedia/what-is-the-difference-between-agent-based-and-agentless-security

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XX ELECTIVE : I	24AMU19D	BUSINESS DATA ANALYTICS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	25	75	100

PREAMBLE:

To introduce the fundamental concepts of Business data analytics and associated methodologies

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand and critically apply the concepts and methods of business analytics	**K1**
CO2	Demonstration the various methodologies of descriptive statistics	**K2**
CO3	Understanding of modeling uncertainty and statistical inference	**K3**
CO4	Understanding of analytical frameworks.	**K4**
CO5	Understanding of Social and collaboration Networks	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution toPOs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.

COURSE CONTENT

UNIT- I Overview of Business Analytics (12 Hours)

Introduction – Drivers for Business Analytics – Applications of Business Analytics: Marketing and Sales, Human Resource, Healthcare, Product Design, Service Design, Customer Service and Support –Skills Required for a Business Analyst–Frame work for Business Analytics Life Cycle for Business Analytics Process.

UNIT- II Essentials of Business Analytics (12 Hours)

Descriptive Statistics – Using Data – Types of Data – Data Distribution Metrics: Frequency, Mean, Median, Mode, Range, Variance, Standard Deviation, Percentile, Quartile, z-Score, Covariance, Correlation–Data Visualization: Tables, Charts, Line Charts, Bar and Column Chart, Bubble Chart, Heat Map–Data Dash boards.

UNIT- III Modeling Uncertainty and Statistical Inference (12 Hours)

Modeling Uncertainty: Events and Probabilities – Conditional Probability – Random Variables –Discrete Probability Distributions – Continuous Probability Distribution – Statistical Inference: Data Sampling–Selecting a Sample–Point Estimation–Sampling Distributions–Interval Estimation–Hypothesis Testing.

UNIT- IV Analytics Using Hadoop and Mapreduce Framework (12 Hours)

Introducing Hadoop – RDBMS versus Hadoop – Hadoop Overview – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Introduction to Map Reduce – Features of Map Reduce –Algorithms Using Map-Reduce:Matrix-Vector Multiplication, Relational Algebra Operations, Grouping and Aggregation–Extensions to Map Reduce.

UNIT -V Other Data Analytical Frameworks (12 Hours)

Overview of Application development Languages for Hadoop – Pig Latin – Hive – Hive Query Language(HQL)–Introduction to Pentaho, JAQL– Introduction to Apache: Sqoop, Drill and Spark, Cloudera Impala–Introduction to No SQL Databases– Hbase and Mongo DB.

TEXT BOOK(S):

1. Vignesh Prajapati, ‑Big Data Analytics with R and Hadoop‖, Packt Publishing, 2013.
2.Umesh R Hodeghatta, Umesha Nayak,‑Business Analytics Using R– A Practical Approach‖, A press,2017.

REFERENCE BOOK(S):

1. Anand Rajaraman, Jeffrey David Ullman, ‑Mining of Massive Datasets‖, Cambridge University Press, 2012.
2. JeffreyD. Camm, JamesJ.Cochran, MichaelJ. Fry, JeffreyW.Ohlmann, DavidR. Anderson ‑Essentials of Business Analytics‖, Cengage Learning, second Edition, 2016
3. U. Dinesh Kumar,‑Business Analytics:The Science of Data-Driven Decision Making‖, Wiley,2017.
4. A. Ohri, ‒R for Business Analytics‖, Springer, 2012 7. Rui Miguel Forte, ‑Mastering Predictive Analytics with R‖,Packt Publication,2015.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	SKILL ENHANCEMENT : II	24SEAMU02	WEB PROGRAMMING - PRACTICAL	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	50	-	50

PREAMBLE:

To learn and develop applications using Web programming languages

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understanding the concepts of HTML tags	**K1, K2**
CO2	Using CSS in HTML code for making dynamic webpage.	**K5**
CO3	Applying script languages to the HTML	**K5**
CO4	Develop a PHP script for web applications	**K5**
CO5	Creating database using PHP	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	9	9
CO5	9	9	9	9	9	9	9
Total Contribution Of COs to POs	45	45	45	45	45	45	45
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

PRACTICAL LIST

1. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us.
2. Write an HTML code to create a Registration Form.
3. Write an HTML code to create a frameset having header, navigation and content sections (use internal CSS)
4. Write programs using Java script for Web Page to display browsers information
5. Develop a JavaScript with POP-UP boxes and functions to add two numbers
6. Write a PHP Script to find out the Sum of the Individual Digits.
7. Write a PHP script for login authentication.
8. Create a student Registration in PHP and Save and Display the student Records using MySQL.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-V	PROFICIENCY ENHANCEMENT	24PEAMU01	ETHICAL HACKING (Self Study)	-	2

Contact hours per week: 0

Year	Semester	Internal Marks	External Marks	Total Marks
III	V	-	100	100

PREAMBLE:

To introduce the concepts of security and different kinds of attacks, system hacking, and penetration testing.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Explain the importance of security and various types of attacks.	**K1**
CO2	Understand the concepts of footprints.	**K2**
CO3	Analyze the scanning and enumeration process.	**K3**
CO4	To study the ethical hacking techniques.	**K4**
CO5	Explain about penetration testing and its methodology.	**K5**

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

CO-POMAPPING (COURSE ARTICULATIONMATRIX)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	3	9	3	3	3
CO4	9	3	3	3	3	1	1
CO5	3	3	3	3	3	1	1
Total Contribution of COs to POs	39	33	27	33	27	23	23
Weighted Percentage Of COs Contribution to POs	2.16	2.42	1.67	2.19	2.30	2.17	2.17

Level of correlation: 0– No correlation; 1 – Low correlation; 3 – Medium correlation; 9-High correlation between COs and POs.

COURSE CONTENT

UNIT- I **Introduction to Hacking**

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research.

UNIT -II **Footprinting**

Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines

UNIT- III **Scanning and Enumeration**

Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

UNIT- IV **System Hacking**

Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges – Executing Applications – Keyloggers and Spyware.

UNIT- V **Penetration Testing**

Introduction – Security Assessments – Types of Penetration Testing - Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools.

TEXTBOOK(S):

1. EC-Council, "Ethical Hacking and Countermeasures: Attack Phase, Cengage Learning, 2010.
2. Jon Erickson, "Hacking, 2nd Edition: The Art of Exploitation", No Starch Press Inc., 2008.
3. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking And Network Defense", Cengage Learning, 2013.

REFERENCE BOOK(S):

1. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy", Second Edition, Elsevier, 2013.
2. Rafay Boloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2014

WEBREFERENCES:

1. **https://dl.hellodigi.ir/dl.hellodigi.ir/dl/book/Ethical%20Hacking%20and%20Countermeasures%20Attack%20Phases.pdf**
2. **https://www.tutorialspoint.com/ethical_hacking/index.htm**
3. **https://www.edureka.co/blog/ethical-hacking-tutorial/**
4. **https://www.geeksforgeeks.org/ethical-hacking-tutorial/**
5. **https://www.eccouncil.org/cybersecurity-exchange/ethical-hacking/system-hacking-definition-types-processes/**
6. **https://youtu.be/PoFvCdmlibM**

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE: XXI	24AMU20	NATURAL LANGUAGE PROCESSING	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To introduce the fundamental concepts and techniques of Natural Language Processing (NLP).

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts and techniques of Natural Language Processing (NLP).	**K1**
CO2	Understanding of the models and algorithms in the field of NLP.	**K2**
CO3	Demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.	**K3**
CO4	Understanding semantics and pragmatics of languages for processing.	**K4**
CO5	Determine the knowledge of secure software installation and testing.	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	3	9	9	3	3
CO4	9	3	3	3	3	3	1
CO5	9	3	3	3	1	1	1
Total Contribution Of COs to POs	45	33	27	33	31	25	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	1.67	2.19	2.65	2.36	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and POs

COURSE CONTENT

UNIT -I **Introduction to NLP** **(15 Hours)**

Introduction: application of NLP techniques and key issues - MT grammar checkers - dictation – document generation - NL interfaces - Natural language processing key issues - the different analysis level used for NLP: morpho-lexical - syntactic - semantic - pragmatic - markup (TEI, UNICODE) - finite state automata - Recursive and augmented transition networks - open problems

UNIT- II **Lexical Level** **(15 Hours)**

Lexical level: error-tolerant lexical processing (spelling error correction) - transducers for the design of morphologic analyzers features - towards syntax: part-of-speech tagging (BRILL, HMM) - efficient representations for linguistic resources (lexica, grammars, …) - tries and finite state automata.

UNIT- III **Syntactic Level** **(15 Hours)**

Syntactic level: grammars (e.g. formal/Chomsky hierarchy, DCSGs, systematic case, unification, stochastic) - parsing (top-down, bottom-up, chart (early algorithm), CYK algorithm) - automated estimation of probabilistic model parameters (inside-outside algorithm) - data-oriented parsing - grammar formalisms and tree banks - efficient parsing for context-free grammars (CFGs) - statistical parsing and probabilistic CFGs (PCFGs) - lexicalized PCFGs.

UNIT -IV **Semantic Level** **(15 Hours)**

Semantic level: logical forms - ambiguity resolution - semantic network and parsers - procedural semantics - Montague semantics - vector space approaches - distributional semantics - lexical semantics and word sense disambiguation - compositional semantics semantic role labeling and semantic parsing

UNIT -V **Pragmatic Level** **(12 Hours)**

Pragmatic level: knowledge representation - reasoning - plan/goal recognition – speech acts/intentions – belief models - discourse-reference. Natural language generation: content determination – sentence planning - surface realization, subjectivity and sentiment analysis: information extraction – automatic summarization - information retrieval and question answering – name identity recognition and relation extraction – IE using sequence labeling - machine translation: basic issues in MT - statistical translation - word alignment - phrase-based translation and synchronous grammars.

TEXTBOOK(S):

1. Daniel J and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics & Speech Recognition", Prentice Hall, 2009.

REFERENCE BOOK(S):

1. Lan H. Written and Elbef, Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann, 2013

WEBREFERENCES:

1. **https://www.deeplearning.ai/resources/natural-language-processing/**
2. **https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP**
3. **https://en.wikipedia.org/wiki/Natural_language_processing**
4. **https://www.geeksforgeeks.org/understanding-semantic-analysis-nlp/**
5. **https://www.codingninjas.com/studio/library/pragmatics-in-nlp**

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXII PRACTICAL : VII	24AMU21	NATURAL LANGUAGE PROCESSING - PRACTICAL	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	40	60	100

PREAMBLE:

To introduce the fundamental concepts and techniques of Natural Language Processing (NLP).

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts and techniques of natural language processing (NLP).	**K1**
CO2	Apply of the models and algorithms in the field of NLP.	**K2**
CO3	Demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.	**K3**
CO4	Apply semantics and pragmatics of languages for processing.	**K4**
CO5	Apply the concepts in real-time applications	**K5**

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

CO-PO MAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	3	9	9	3	3
CO4	9	3	3	3	3	3	1
CO5	9	3	3	3	1	1	1
Total Contribution Of COs to POs	45	33	27	33	31	25	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	1.67	2.19	2.65	2.36	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation;

9-High correlation between COs and POs

PRACTICAL LIST

1. Implementing word similarity.
2. Implementing simple problems related to word disambiguation.
3. Simple demonstration of part-of-speech tagging.
4. Lexical analyzer.
5. Semantic analyzer.
6. Sentiment analysis.

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:XXIII	24AMU22	ROBOTICS AND ITS APPLICATIONS	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To introduce the fundamental concepts and techniques of Natural Language Processing (NLP)

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Describe the different physical forms of robot architectures.	**K1**
CO2	Explain about the actuators and characteristics of actuating systems.	**K2**
CO3	Demonstrate to mathematically describe a kinematic robot system.	**K3**
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	**K4**
CO5	To know the various applications of robots that are used today and in the future.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	3	3
CO5	9	3	9	3	3	3	1
Total Contribution of COs to POs	45	33	45	39	27	27	25
Weighted Percentage of COs Contributions POs	2.49	2.42	2.78	2.59	2.30	2.54	2.36

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and Pos

COURSE CONTENT

UNIT- I Introduction to Robotics (15 Hours)

Robotics: History, Present Status and Future Trends: Philosophical Considerations -Robotics and Programmable Automation - Historical Background -Laws of Robotics-1.5 Robot Definitions-Robotics Systems and Robot Anatomy-Human Systems and Robotics Specifications of Robots -Present Application Status-Machine Intelligence, Computer and Robotics Future Trends -Flexible Automation Versus Robotics Technology - Safety Measures in Robotics

UNIT- II Robotics Kinematics (15 Hours)

Robot Kinematics and Dynamics: Introduction - Forward and Reverse Kinematics (Transformation) -Three Degrees of Freedom Robot Arm -Forward and Reverse Transformation of a Four Degrees of Freedom Manipulator in 3D- Homogeneous Transformations -Kinematic Equations Using Homogeneous –Transformations- Inverse Kinematics of Robot.

UNIT- III Actuators and Controls (12 Hours)

Robot Drives, Actuators and Control- Functions of Drive Systems- General Types of Fluids - Pump Classification-Introduction to Pneumatic Systems-Electrical Drives - D.C. Motors and Transfer Functions - A.C. Motors - Piezoelectric Actuators - Stepper Motor

UNIT- IV Sensors (15 Hours)

Robot End- Effectors - Introduction - Classification of End-effectors - Drive System for Grippers - Mechanical Grippers - Magnetic Grippers - Vacuum Grippers - Adhesive Grippers - Hooks, Scoops and Other Miscellaneous Devices - Gripper Force Analysis and Gripper Design - Design of Multiple Degrees of Freedom Instrumented Robot Hand - Active and Passive Grippers. Sensors and Intelligent Robots: Artificial Intelligence and Automated – Manufacturing - Al and Robotics - Need for Sensing Systems - Sensory Devices - Types of Sensors - Robot Vision Systems

UNIT- V Applications of Robots (15Hours)

Robot Languages and Programming: Robot Languages - Classification of Robot Languages - Computer Control and Robot Software - VAL System and Language. Applications of Robot: Introduction – Capabilities of Robotics – Robotics Applications – Obstacle Avoidance – Other Uses of Robots.

TEXTBOOK(S)

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009.

REFERENCE BOOK(S)

1. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012.

2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009

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1. https://en.wikipedia.org/wiki/Robotics
2. https://www.toptal.com/robotics/programming-a-robot-an-introductory-tutorial
3. https://www.brainkart.com/article/Fundamentals-of-Robot_5118/
4. https://en.wikipedia.org/wiki/Sensor
5. https://instrumentationtools.com/applications-of-robots-in-various-fields/

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE :XXIV ELECTIVE:II	24AMU23A	DEEP LEARNING – LEVEL 2	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To gain the knowledge about Deep Learning Techniques

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Define the concept of RNN (Recurrent Neural Network).	K1
CO2	Explain about Reinforcement Learning.	K2
CO3	Discuss the deep planning frameworks for prediction.	K3
CO4	Describe the working of Tensor Flow using Keras.	K4
CO5	Case studies on using deep learning techniques.	K5

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

CO-POMAPPING(COURSE ARTICULATIONMATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation;

9-High correlation between COs and POs

COURSE CONTENT

UNIT- I Sequence Modeling Using Recurrent Neural Networks (12 Hours)

Basic Architecture Of An Rnn- Training Rnns : Back-Propagation Through Time-Long Short-Term Memories-Deep Recurrent Networks

UNIT- II Deep Learning Networks In Reinforcement Learning Framework (12 Hours)

lements Of Reinforcement Learning-Basics Of Dynamic Programming-Temporal Difference Learning And Monte Carlo Method-Neural Networks In Rl Framework For Generalization Value-Based Methods For Deep Reinforcement Learning

UNIT- III Important Deep Planning Frameworks (12 Hours)

Introduction- Refresher Of Python Programming: Python Objects-Basic Libraries In Python; Review Of Python Scikit- Learn:Data Pre-Processing-Model Fitting And Predicting- Model Evaluation

UNIT- IV TensorFlow 2.0 With Keras Programming (12 Hours)

Introduction:Setting Up the Programming Environment-Start Programming With TensorflowKeras; Pytorch Programming: Setting Up The Programming Environment-Start Programming With Pytorch.

UNIT- V Deep Learning Case Studies (12 Hours)

Case Study 1: Disease Direction From Chest X-Ray Images-Case Study 2: Colourization Of Grey Scale Images-Case Study 3: Obtaining Vector Representations From Source-Code.

TEXTBOOK:

1.DEEP LEARNING by Amit Kumar Das,Saptarasi Gosw Ami,Pabitra Mitra and Amilan Chakrabarti, Published by Pearson India Education Services.
2.Deep Learning Core Concepts ,Methods and Applications by M.Gopal Published by Pearson India Education Services.

BOOK REFERENCES:

1."Neural Networks and Deep Learning: A Textbook" by Charu C. Aggarwal, 1st Edition, 2018, Springer
2."Deep Learning for Computer Vision" by Rajalingappaa Shanmugamani, 1st Edition, 2019, Packt Publishing

WEB REFERENCE:

1. **https://www.kaggle.com/learn/intro-to-deep-learning**
2. **https://www.javatpoint.com/deep-learning**
3. https://www.datacamp.com/tutorial/tutorial-deep-learning-tutorial
4. https://www.w3schools.com/ai/ai_neural_networks.asp

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXIV ELECTIVE:II	24AMU23B	DATA SCIENCE - LEVEL 2	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To understand the secure software development lifecycle, and to explain about secure coding techniques.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Discuss the data science tools used with python	**K1**
CO2	Explain about the use of R in Data science	**K2**
CO3	Define the work flow of data science with MATLAB	**K3**
CO4	Classify other tools used in data science	**K4**
CO5	Illustrate the need of data science in business	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and Pos

COURSE CONTENT

UNIT- I Data Science Tool: Python (12 Hours)

Basics Of Python For Data Science- Python Libraries: Data Frame Manipulation With Pandas And Numpy- Exploration Data Analysis With Python- Time Series Data- Clustering With Python-Arch And Garch-Dimensionality Reduction-Python For Machine Ml-Knn/Decision Tree/Random Forest /Svm-Python Ides For Data Science.

UNIT- II Data Science Tool: R (12 Hours)

Reading And The Getting Data Into R- Ordered And Unordered Factors- Arrays And Matrices- List And Date Frames- Probability Distributions- Statistical Models In R-Manipulating Objects-Data Distribution.

UNIT-III Data Science Tool: Matlab (12 Hours)

Data Science Workflow With Matlab-Importing Data: How Data Is Stored- How Matlab Represents Data-Matlab Data Types- Automating The Import Process;Visualising And Filtering Data: Plotting Data Contained In Tables- Selecting Data From Tables -Accessing And Creating Table Variables; Performing Calculations: Basic Mathematical Operations-Using Vectors- Using Functions- Calculating Summary Statistics- Correlations Between Variables- Accessing Subsets Of Data- Performing Calculations By Category

UNIT-IV Gnu Octave As A Data Science Tool (12 Hours)

Vectors And Matrices-Arithmetic Operations- Set Operations- Plotting Data; Visualization Using Tableau: Introduction To Data Visualization-Introduction To Tableau- Dimensions And Measures ,Descriptive Statistics-Basic Charts- Dashboard Design And Principles-Special Chart Types- Integrate Tableau With Google Sheets.

UNIT- V Data Science And Business Strategy (12 Hours)

Thinking Data-Analytically,Redux- Achieving Competitive Advantage With Data Science-Sustaining Competitive Advantage With Data Science- Attracting And Nurturing Data Scientist And Their Teams -Examine Data Science Case Studies.

TEXTBOOK:

1. Sanjeev J. Wagh, Manisha S. Bhende and Anuradha D.Thakare, “Fundamentals of Data Science”, CRC Press,
2. "Data Science for Business" by Foster Provost and Tom Fawcett was published in 2013 by O'Reilly Media.

BOOK REFERENCES:

1. "Data Science from Scratch" by Joel Grus, 1st Edition, 2015, O'Reilly Media
2. "Data Smart: Using Data Science to Transform Information into Insight" by John W. Foreman was published in 2013 by Wiley.

WEB REFERENCES:

1. https://www.w3schools.com/datascience/
2. https://www.simplilearn.com/tutorials/data-science-tutorial
3. https://intellipaat.com/blog/tutorial/data-science-tutorial/
4. https://www.tutorialspoint.com/data_science/index.htm

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXIV ELECTIVE : II	24AMU23C	WEB APPLICATION SECURITY	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

- To introduce the concepts of security in web applications
- To explain about crime prevention and routine duties in a police station

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Illustrate about the concept to HTML, DHTML, CSS and Java Script.	**K1**
CO2	Explain the history, characteristics, technologies, concepts, usage in web2.0and web3.0	**K2**
CO3	Apply the core concepts of web applications to create web pages	**K3**
CO4	Apply the concepts of server-side programming	**K4**
CO5	Evaluate the requirements of web2.0 in education, philanthropy, social work.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution ofCOs to POs	45	33	39	39	25	23	23
Weighted Percentage of COsContribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT- I **Introduction to Web** **(12 Hours)**

Data with URL- HTML - DHTML: Cascading Style Sheets, Common Gateway Interface: Programming CG! Scripts-HTML Forms-:-Custom Database Query Scripts-Server Side Includes-Server _security issues.

UNIT- II **XHTML** **(12 Hours)**

XHTML: Introduction, CSS-Scripting languages-Java Script: Control statements, Functions, Arrays, Objects-DOM- Aiax enable rich internet applications

UNIT- III **Server Side Programming** **(12 Hours)**

ServersideProgramming-Activeserverpages-Javaserverpages-JavaServlets:Servletcontainer-Exceptions-SessionsandSessionTracking_-UsingServletcontext-DynamicContentGeneration-Servlet Chaining and Communications.

UNIT- IV **HTML5** **(12 Hours)**

HTML review, Feature detection, TheHTML5new Elements, Canvas, Video and audio, Web storage, Geo location, Offline Web pages, Micro data, HTML5APLS, Migrating from HTML4to HTML5, CSS3

UNIT- V **WEB2.0** **(12 Hours)**

WEB 2.0-HISTORY, characteristics, technologies, concepts, usage, web2.0 in education, philanthropy, social work. Web3.0- Theory-and history understanding. Basic web artifacts and applications, implementation. MS share point - Share point 2013 overview ,share (Put social to work ,Share your stuff, Take share point on the go), Discover (find experts, discover answers, find what you are looking for), Manage(cost, risk, time)

TEXT BOOK(S):

1. Deitel, Deitel and Neita,-Internet and World Wide Web-How to program ll, PearsonEducation ,4th Edition, 2009..
2. Elliotte Rusty Herold, -Java Network Programming II, O'Reilly Publications,3rd Edition,2004.

REFERENCE BOOK(S):

1. Jeffy D wight, Michael Erwin and Robert Nikes-USINGCGIII, PH.I Publications,1997
2. Jason Hunter, William Crawford-Java Servlet Programming O'Reilly Publications,2nd Edition, 2001
3. Eric Ladd and Jim O' Donnell, etal,-USING HTML4, XML, andJAVA1.2, Prentice Hall,2003
4. Jeremy Keith,-Html5 for web designers

WEB REFERENCES:

1. **https://www.studytonight.com/servlet/introduction-to-web.php**
2. **https://en.wikipedia.org/wiki/XHTML**
3. **https://developer.mozilla.org/en-US/docs/Learn/Server-side/First_steps/Introduction**
4. **https://en.wikipedia.org/wiki/HTML5**
5. **https://www.investopedia.com/terms/w/web-20.asp**

CATEGORY	COURSETYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART-III	CORE : XXIV ELECTIVE : II	24AMU23D	ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE :

- To introduce the concepts of artificial neural networks and fuzzy systems'
- To explain the basic mathematical elements of the theory of fuzzy sets.

COURSE OUTCOME :

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Explain the concepts of neural networks and ,fuzzy logic	K1
CO2	Understanding of the basic mathematical elements of the theory of fuzzy sets.	K2
CO3	Understanding the differences and similarities between fuzzy sets and classical sets theories	K3
CO4	Solve problems that are appropriately solved by neural networks and fuzzy logic	K4
CO5	Determine the usage of Neural networks, Fuzzy logics, and Genetic algorithms	K5

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
otal Contributionof COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COsContribution to POs	2.49	2.42	2.41	2.59	2.13	2.17	2.17

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT I **Introduction** **(12 Hours)**

Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline-Learning rules-Supervised learning-Backpropagation networks-Training algorithm, Advanced algorithms-Adaptive network-Radial basis network modular network-Applications

UNIT II **Learning** **(12 Hours)**

Introduction-unsupervised learning-Competitive learning networks-Kohonen self organizing networks-Learning vector quantisation - Hebbian learning – Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem-Adaptive resonance theory–Bidirectional Associative Memory-Principle component Analysis

UNIT III **Fuzzy Sets** **(12 Hours)**

Introduction–crisp sets an overview–the notion of fuzzy sets–Basicconceptsoffuzzysets–classicallogicanoverview–Fuzzylogic.Operationsonfuzzysets-fuzzycomplement–fuzzyunion–fuzzyintersection –combinations of operations–general aggregation operations

UNIT IV **Relations** **(12 Hours)**

Crisp and fuzzy relations–binary relations–binary relationsonasingleset–equivalenceandsimilarityrelations–Compatibility or tolerance relations–orderings–Membership functions–methods of generation – defuzzification methods

UNIT V **Tree Learning** **(12 Hours)**

Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

TEXT BOOK(S):

1. Neuro Fuzzy and Soft computing‖, JangJ.S.R.,Sun C.T and Mizutani E–Pearson education,2004..
2. Fundamentals of Neural Networks‖, Laurene Fauseett,PrenticeHallIndia,NewDelhi,1994.

REFERENCE BOOK(S):

1. FuzzyLogicEngineeringApplications‖, TimothyJ.Ross,McGraw Hill,NewYork,1997.
2. Fuzzy Sets and Fuzzy Logic‖,GeorgeJ.KlirandBoYuan,Prentice HallInc., NewJersey,1995
3. Neural networks, Fuzzy logics, and Genetic algorithms‖, S.Rajasekar anand G.A.Vijayalakshmi Pai Prentice Hall of India,2003

WEB RERERENCES:

1. https://en.wikipedia.org/wiki/Artificial_neural_network
2. https://www.geeksforgeeks.org/artificial-neural-networks-and-its-applications/
3. https://en.wikipedia.org/wiki/Fuzzy_set
4. https://codecrucks.com/fuzzy-relation-definition-types-and-operations/
5. https://en.wikipedia.org/wiki/Decision_tree_learning

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXV ELECTIVE:III	24AMU24A	BIG DATA ANALYTICS	60	4

Contact Hours per Week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To introduce the fundamental concepts of business data analytics and associated methodologies.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand and critically apply the concepts and methods of data analytics.	**K1**
CO2	Demonstrate the various methodologies of NoSQL and Hadoop.	**K2**
CO3	Understanding the need for Mongo DB.	**K3**
CO4	Understanding of analytical frameworks.	**K4**
CO5	Understanding of social and collaboration networks.	**K5**

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

CO-POMAPPING(COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	1.28	1.70	1.89

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and POs

COURSE CONTENT

UNIT- I **Introduction to Big Data** **(12 Hours)**

Characteristics of Data- Evolution of Big Data - Definition of Big Data - Challenges with Big Data - What is Big Data? -Other Characteristics of Data Which are not Definitional Traits of Big Data - Why Big Data? - Traditional Business Intelligence (BI) versus Big Data. What is Big Data Analytics? - Classification of Analytics - Why is Big Data Analytics Important? - Terminologies Used in Big Data Environments - Basically Available Soft State Eventual Consistency (BASE) - Few Top Analytics Tools - Open Source Analytics Tools

UNIT- II **NOSQL** **(12 Hours)**

The Big Data Technology Landscape: NoSQL (Not Only SQL)–Hadoop - Introducing Hadoop - Why Hadoop? - Why not RDBMS?- RDBMS versus Hadoop - Distributed Computing Challenges - Hadoop Overview - Use Case of Hadoop - Hadoop Distributors - HDFS (Hadoop Distributed File System) - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN -Interacting with Hadoop Ecosystem

UNIT- III **MongoDB** **(12 Hours)**

What is MongoDB? - Why MongoDB? - Terms Used in RDBMS and MongoDB - Data Types in MongoDB– MongoDB Query Language. Introduction to Cassandra: Features of Cassandra – CQL Datatypes - CRUD (Create, Read, Update, and Delete) Operations - Using a Counter - Time to Live (TTL) - Alter Commands - Import and Export

UNIT- IV **Map Reduce** **(12 Hours)**

Introduction – Mapper - Reducer – Combiner - Partitioner - Searching - Sorting – Compression - Introduction to Hive: What is Hive? - Hive Architecture - Hive Data Types – Hive File Formats - Hive Query Language (HQL) - RCFile Implementation – User Defined Functions.

UNIT- V **Pig** **(12 Hours)**

What is Pig? - The Anatomy of Pig - Pig on Hadoop - Pig Philosophy - Use Case for Pig: ETL Processing Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions (UDF) - When to use Pig? When not to use Pig? - Pig at Yahoo! - Pig versus Hive.

TEXT BOOK:

1. Big Data and Analytics, Seema Acharya, Subashini Chellapan, Wiley Publications, 2nd Edition.
2. Vignesh Prajapati,―Big Data Analytics with R and Hadoop‖,Packt Publishing,2013.
3. Umesh R Hodeghatta, Umesha Nayak,―Business Analytics Using R–A Practical Approach‖ ,Apress, 2017.

REFERENCE BOOK(S):

1. Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

2.Jeffrey D. Camm, James J. Cochran, Michael J. Fry, Jeffrey W. Ohlmann, David R. Anderson, "Essentials of Business Analytics", Cengage Learning, Second Edition, 2016.

3.U. Dinesh Kumar, "Business Analytics: The Science of Data-Driven Decision Making", Wiley, 2017.

4.A. Ohri, "R for Business Analytics", Springer, 2012.

5.Rui Miguel Forte, "Mastering Predictive Analytics with R", Packt Publication, 2015.

WEB REFERENCES

1. https://www.oracle.com/in/business-analytics/what-is-business-analytics//
2. https://www.simplilearn.com/r-programming-language-business-analytics-quick-guide-article
3. https://www.tutorialspoint.com/business_analysis/index.htm
4. https://www.tutorialspoint.com/big_data_analytics/index.htm
5. https://www.analyticssteps.com/blogs/9-techniques-used-business-analytics-framework

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE:XXV ELECTIVE:III	24AMU24B	OPEN SOURCE SOFTWARE	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To empower the students to create flexible, transparent and cost-effective web applications using Open Source Technologies.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Remember the basics of Open Source Software and Linux.	**K1**
CO2	Demonstrate the concepts of Android.	**K2**
CO3	Utilize the syntax of PHP Language.	**K3**
CO4	Analyze an insight on MySQL Database.	**K4**
CO5	Assess General introduction on Open Source Grid Computing.	**K5**

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

CO-POMAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	1.28	1.70	1.89

Level of correlation: 0–No correlation; 1 –Low correlation; 3 –Medium correlation; 9-High correlation between COs and POs

COURSE CONTENT

UNIT- I Introduction to OSS & Linux Basics (12 Hours)

Introduction – Need for Open Source Applications – Advantages – Disadvantages – History – Free Software Foundation and Open Source Initiative Presentation – Security and Reliability – Economical Aspects – Applications of Open Source Software. Linux Basics – Introduction – Kernel/User Mode - Process – Advanced Concepts Scheduling.

UNIT- II Android (12 Hours)

Introduction – Open Source Android Platform – History - Android Architecture – Android Versions - Dalvik Virtual Machines - Characteristics – Installing Eclipse ADT Plug-in and Android SDK Packages – Android Virtual Device or Emulator – File System Hierarchy – Android sample apps.

UNIT-III PHP Basics (12 Hours)

Introduction – Identifiers, Variables, Constants, Data Types, Operators – Statements, Loops – Advanced PHP – Get and Post Methods – Arrays in PHP – Object Oriented Concepts – Strings – File Handling and Data Storage.

UNIT- IV MySQL Database (12 Hours)

Introduction – Setting up an Environment – Starting, Terminating and Writing Your Own SQL Programs – Record Selection Technology – Working with String Functions, Date and Time – Sorting Query Results – Using Sequences – PHP and MYSQL Database.

UNIT- V Open Source Grid Computing & Open Source Cloud (12 Hours)

Introduction – Open Grid Service Architecture – Open Grid Service Infrastructure – Web Service Resource Framework – OGSA Basic Services – Security Issues. Introduction – FOSS Cloud Software Environments – Eucalyptus – OpenNebula – OpenStack.

TEXTBOOK(S):

1.M.N.Rao,FundamentalsofOpenSourcesoftware,PHILearningPrivateLimited,2015.

REFERENCEBOOK(S):

1. Dr.DayanandAmbawade,Dr.DevenShah&DTEditorialServices,LinuxLabsandOpenSou rceTcchnologiesn,dreamtechpress,2015

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1. https://en.wikipedia.org/wiki/Open-source_software
2. https://web.stanford.edu/class/cs231m/lectures/lecture-2-android-dev.pdf
3. https://www.w3schools.com/php/php_mysql_intro.asp
4. https://www.tutorialspoint.com/php/php_and_mysql.htm
5. https://computingforgeeks.com/top-open-source-cloud-platforms-and-solutions/?expand_article=1

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXV ELECTIVE : III	24AMU24C	EMBEDDED SYSTEM	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To enhance the functionality and intelligence of embedded applications.

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Understand hardware and software design requirements of embedded systems.	**K1**
CO2	Explain the architecture of microprocessors and operating systems in embedded systems.	**K2**
CO3	Apply the concept of Semaphores with Semaphore Problems.	**K3**
CO4	Analyze the embedded systems' specification and develop software programs.	**K4**
CO5	Evaluate the requirements of programming Embedded Systems, related software Architectures, and tool chain for Embedded Systems.	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contributionof COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	1.28	1.70	1.89

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs

COURSE CONTENT

UNIT- I **Introduction to Embedded System** **(12 Hours)**

Examples of Embedded Systems–Typical Hardware–Memory–Microprocessors–Busses–Direct Memory Access– Introduction to 8051Microcontroller–Architecture-Instruction set – Programming

UNIT- II **Microprocessor** **(12 Hours)**

Microprocessor Architecture–Interrupt Basics–The Shared-Data problem–Interrupt Latency-Round–Robin Architecture-Round–Robin with Interrupts Architecture-Function-Queue Scheduling Architecture–Real-Time Operating Systems Architecture –Selection of Architecture.

UNIT- III **Semaphores** **(12 Hours)**

Tasks and Task States–Tasks and Data–Semaphores and Shared Data–Semaphore Problems–Semaphore variants.

UNIT- IV **Message Queues & RTOS** **(12 Hours)**

Message Queues–Mailboxes–Pipes–Timer Functions–Events–Memory Management–Interrupt Routines in RTOS Environment. RTOS design–Principles–Encapsulation Semaphores and Queues–Hard Real-Time Scheduling Considerations – Saving Memory Space– Saving Power

UNIT- V **Host Machine & Testing** **(12 Hours)**

Host and Target Machines–Linker/Locator for Embedded Software-Getting Embedded Software in to the Target System. Testing on your Host Machine – Instruction Set Simulators–Laboratory Tools used for Debugging

TEXT BOOK(S):

1. The8051Microcontroller Architecture, Programming & Applications, KennethJ. Ayala,Penram International.
2. An Embedded Software Primer,DavidE.Simon,PearsonEducation,2005.

REFERENCE BOOK(S):

1. Embedded Systems: Architecture, Programming and Design, Raj Kamal, Tata McGraw-HillEducation,2008

WEB REFRENCES:

1. https://www.slac.stanford.edu/exp/npa/xilinx/est_rm.pdf
2. https://realtimelogic.com/articles/Embedded-Web-Server-Tutorials
3. https://en.wikipedia.org/wiki/Semaphore_(programming)
4. https://ptolemy.berkeley.edu/books/leeseshia/releases/LeeSeshia_DigitalV2_2.pdf
5. https://www.dauniv.ac.in/public/frontassets/coursematerial/embeddedsystems/Chap_15Less__on01Em sys3EIntegratedTestsAtHostsystem.pdf

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-III	CORE : XXV ELECTIVE : III	24AMU24D	PRINCIPLES OF SECURE CODING	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	25	75	100

PREAMBLE:

To understand the secure software development life cycle and explain about the securecoding techniques

COURSE OUTCOME:

On the successful completion of the course, students will be able to

COs	CO Statement	Knowledge Level
CO1	Explain about the secure software development life cycle, attacks and issues occurred	**K1**
CO2	Understand the secure coding techniques, risk mitigation	**K2**
CO3	Demonstrate the threat modeling process and security techniques	**K3**
CO4	Explain about the database and web specific issues	**K4**
CO5	Understanding about the Security code overview, secure software installation	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	3	9	9	3	1	1
CO5	9	3	3	3	1	1	1
Total Contribution of COs to POs	45	33	39	39	25	23	23
Weighted Percentage of COs Contribution to POs	2.49	3.30	2.78	2.99	1.28	1.70	1.89

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

COURSE CONTENT

UNIT- I Introduction to Security (12 Hours)

Need for secure systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC), Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code- Best PracticesSD3(Secure by design, default and deployment), Security principles and Secure Product Development Timeline

UNIT- II Threat modeling process and its benefits (12 Hours)

Threat modeling process and its benefits: Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defense in Depth and Principle of Least Privilege

UNIT- III Secure Coding Techniques (12 Hours)

Secure Coding Techniques: Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, Insecure Coding Practices in Java Technology. ARP Spoofing and its counter measures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors, Format String Bugs. Security Issues in C Language: String Handling, Avoiding Integer Overflows and Underflows and Type Conversion Issues-Memory Management Issues, Code Injection Attacks, Canary based counter measures using Stack Guard and Pro police. Socket Security, Avoiding Server Hijacking, Securing RPC.

UNIT- IV Database and Web- specific issues (12 Hours)

Database and Web-specific issues: SOL Injection Techniques and Remedies, Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Inter process Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types-Persistent and Non persistent attack XSS Counter measures and By passing the XSS Filters.

UNIT- V Testing Secure Applications (12 Hours)

Testing Secure Applications: Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP- Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers.

TEXT BOOK(S):

1. Writing Secure Code, Michael Howard and David LeBlanc, Microsoft Press, 2nd Edition, 2004

REFERENCE BOOK(S):

1. Programming PHP, Rasmus Lerdorfand Levin Tatroe,O_Reilly,2002.
2. Core Python Programming, WesleyJ.Chun, PrenticeHall,2001
3. Perl: The Complete Reference,2nd Edn, MartinC. Brown,TMH, 2009
4. MySQL:The Complete Reference,2nd Edn,VikramVaswani,TMH,2009

WEB REFERENCES:

1. https://vulcan.io/blog/secure-sdlc-best-practices/
2. https://docs.oracle.com/en/operating-systems/oracle-linux/6/security/ol_desprinsc_sec.html
3. https://codesigningstore.com/secure-coding-practices-to-implement
4. https://www.cs.uct.ac.za/mit_notes/database/htmls/chp17.html
5. https://www.breachlock.com/resources/blog/types-of-application-security-testing/

Category	Component	Course Code	Course Title	Contact Hours/ Semester	Credit
PART-IV	Skill Enhancement: III	24SEAMU03	GOOGLE COLAB - PRACTICAL	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
III	VI	50	-	50

PREAMBLE:

To enable the students to learn the concepts of Google cloud

COURSE CONTENT:

On the successful completion of the course, students will be able to

COs	CO Statement	KnowledgeLevel
CO1	Learn the Google colab	**K1**
CO2	Understand colab environment	**K2**
CO3	Apply various colab functions	**K3**
CO4	Explore colab functions	**K4**
CO5	Evaluate various colab features	**K5**

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

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	9	9	9
CO5	9	9	9	9	9	9	9
Total Contribution of COs to POs	45	45	45	45	45	45	45
Weighted Percentageof COs Contribution to POs	2.49	3.30	2.78	2.99	3.84	4.24	4.25

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos

PRACTICAL LIST

1. DataScience: The code cell uses **numpy** to generate some random data and uses **matplotlib** to visualize it
2. ML: import an image dataset, train an image classifier on it and evaluate the model
3. Program using Text cells
4. Exception formatting
5. Generate rich chart
6. Integrate with drive
7. Commenting on a cell
8. Factorial of a number
9. A program using forms
10. Interactive Using Jupyter Widgets sliders