



KAMARAJ COLLEGE
(AUTONOMOUS)
Accredited with A+ Grade by NAAC
Among Top 150 Colleges in India - NIRF Ranking 2025
இந்து நாடார் சங்கங்களால் 1966-ல் தொடங்கப்பட்ட கல்லூரி
(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)
THOOTHUKUDI - 628 003.



B.C.A

Semester - I to VI

(for the students those who joined from the academic year 2024-2025)



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SYLLABUS

(for the students those who joined from the academic year 2024-2025)

Department Profile

Name of the Programme	: B.C.A.,
Programme Code	: 04020
Year of Establishment	: 2014

Vision:

Achieving excellence in Information Technology Enabled Services through Teaching, Extension and Consultancy.

Mission:

To offer accredited under graduate programmes with the state-of-art technology throughout the Nation to maintain high academic standards and teaching quality.

To be a centre of excellence for innovation in frontier areas of Computer Science and technology relevant to the country.

College Mail Id kamarajcoll@gmail.com

College Website www.kamarajcollege.ac.in

Undergraduate Degree Programme

1. Introduction

Programme Outcome, Programme Specific Outcomes and Course Outcomes
Students completing this programme will be able to present their core under-graduate discipline clearly and precisely, make abstract ideas precise by formulating them in the language of the specific discipline, describe related ideas from multiple perspectives and explain fundamental concepts. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in various other public and private enterprises.

Eligibility: Passed the 10 + 2 (Higher Secondary) examination conducted by Government of Tamil Nadu with Mathematics / Computer Science / Business Mathematics as one of the Subject or other equivalent examinations (Minimum Aggregate of 50%)

Learning Outcomes-Based Curriculum Framework Guidelines Based Regulations For Under Graduate Programme	
Programme:	B.C.A.
Programme Code:	04020
Duration:	3 Years (UG)
Programme Outcomes:	
PO1:	Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study.
PO2:	Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

<p>P03:</p>	<p>Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p>
<p>P04:</p>	<p>Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.</p>
<p>P05:</p>	<p>Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p>
<p>P06:</p>	<p>Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p>
<p>P07:</p>	<p>Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p>
<p>P08:</p>	<p>Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p>

Programme Specific Outcomes (PSOs):

PSO1: Placement: To prepare the students who will demonstrate respectful engagement with others ideas, behaviour and beliefs. Also apply diverse frames of reference to decisions and actions.

PSO2: Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skills that will facilities start- ups and high potential organisations.

PSO3: Research and Development: Design and implement HR system and practices grounded in research that complies with employment laws, leading the organisation towards growth and development.

PSO4: Contribution to Business Words: To produce employability, ethical and innovative professionals to sustain in the dynamic business world.

PSO5: Contribution to the Society: To contribute to the development of the society by collaborating with stakeholders for mutual benefits.

Methods of Assessment	
Recall (K1)	Simple definitions , MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate Between various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Methods of Evaluation		Marks	
Internal Evaluation	Continuous Internal Assessment Test	15	25
	Assignment (PPT) and Seminar	5	
	Group Discussion and Viva	5	
External Evaluation	End Semester Examination		75
Total			100

Extra Credits

Curricular Activities	Co-Curricular Activities	Extra-Curricular Activities
Paper Presentation	Cultural Competitions	NCC
Paper Publication	Domain Clubs	NSS
Placement Training		Sports
Quiz		YRC
Competitions		UBA
SWAYAM /NPTEL/MOOCs		

Level	Credit			
	Participation	III Prize	II Prize	I Prize
Intra college	1	2	3	4
Intercollegiate	2	3	4	5
District	3	4	5	6
University	4	5	6	7
State	5	6	7	8
National	6	7	8	9
International	7	8	9	10

****Paper Presentation for each paper: 1credit**

Total credits Under-Graduate Courses including Lab Hours - 2024 to 2025

Semester	Hours	Credits	Additional Credits
I	30	22	2
II	30	22	2
III	30	23	2
IV	30	24	2
V	30	27	3
VI	30	23	3
Total		141	14

**Extra Credit will be given on the basis of student's performances

Written Examination: Theory Paper (Bloom's Taxonomy based) Question paper Model Assessment Pattern

Continuous Internal Assessment (CIA) & End Semester Examination (ESE)

- CIA : 25
- ESE: 75

Theory Course:

For theory courses there shall be two tests conducted by the faculty concerned and the average of the two can be taken as the Continuous Internal Assessment (CIA). CIA is for 30 marks max and will be converted in to 15 marks. The duration of each test shall be 1 ¼ Hrs.

Continuous Internal Assessment (Writing)	15 marks
Assignment (PPT) & Seminar	5 marks
Viva & Group Discussion	5 marks

For theory Papers:

- Part A (10×1=10) Marks-Answer all questions (Multiple choice)
- Part B (5×5=25) Marks-Choosing either(a) or (b)
- Part C (5×8=40) Marks-Choosing either (a) or (b)

Total =75 marks

Laboratory Courses Assessment

- CIA - 40 marks
- ESE - 60 marks
- Mandatory Record submission, attendance and class participation.
- Two CIA for 40 marks max. The average of the best two can be taken as the Continuous Internal Assessment.
- The duration of each test shall be 3 hours. In order to avoid pull the score down of each PO, it is suggested that the usage L-Low (1) to the minimum. The S, M, L is based on the Course outcomes. The mapping is based on the revised Bloom's

Taxonomy Verbs used to describe your Course outcomes.

- Remember and Understanding–Lower level
- Apply and Analyze– Medium Level
- Evaluate and Create–Strong Level

Pedagogy:

- Technology Based Learning (PPT)
- Peer Teaching (Chalk & Talk)
- Virtual Lab
- Blended Learning (Online & Offline)
- Group Learning
- Self - Study
- Games Based Learning

Course Structure for Science Stream

First Year – Semester I

B.C.A

(With effect from the academic year 2024 to 2025 onwards)

Semester I	Course Code	Title of the Course	Hrs./ Week	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - I	24ULTL11	இலக்கிய வரலாறு - I	6	3	3	25	75	100
Part - II	24ULEN11	General English - I	6	3	3	25	75	100
Part - II Core - I	24UMCA11	Python Programming	5	5	3	25	75	100
Core Lab - I	24UMCAL1	Python Programming Lab	5	4	3	40	60	100
EC - I (Select any one)	24UECA11 24UECA12	1. Discrete Mathematics 2. Numerical Methods	4	3	3	25	75	100
Part - IV SEC - I Lab	24USCAL1	Office Automation Lab	2	2	3	40	60	100
FC	24UFCA11	Fundamentals of Information Technology	2	2	3	25	75	100
Total			30	22				
** SEC-Skill Enhancement Course				**CIA- Continuous Internal Assessment				
**EC –Elective Course				** ESE- End Semester Examination				
**FC - Foundation course								

Course Structure for Science Stream
First Year – Semester II
B.C.A
(With effect from the academic year 2024 – 2025 onwards)

Semester II	Course Code	Title of the Course	Hours /Week L/P	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - I	24ULTL21	தமிழ் இலக்கிய வரலாறு -II	6	3	3	25	75	100
Part - II	24ULEN21	General English – II	6	3	3	25	75	100
Part - III Core - II	24UMCA21	Object Oriented Programming with C++	5	5	3	25	75	100
Core Lab - 2	24UMCAL2	Object Oriented Programming with C++ Lab	5	4	3	40	60	100
EC - II (Select any one)	24UECA21 24UECA22	1. Digital Logic Fundamentals 2. Optimization Techniques	4	3	3	25	75	100
Part - IV SEC - II	24USCA21	Web Design	2	2	3	25	75	100
SEC - III Lab -2	24USCAL2	HTML Lab	2	2	3	40	60	100
		Total	30	22				
** SEC-Skill Enhancement Course ** CIA- Continuous Internal Assessment ** EC -Elective Course ** ESE- End Semester Examination								

Course Structure for Science Stream
Second Year – Semester III
B.C.A
(With effect from the academic year 2024 to 2025 onwards)

Semester III	Course Code	Title of the Course	Hours /Week	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - I	24ULTL31	தமிழக வரலாறும் பண்பாடும்	6	3	3	25	75	100
Part - II	24ULEN31	General English Part - III	6	3	3	25	75	100
Part - III Core - III	24UMCA31	Data Structures and Algorithms	5	5	3	25	75	100
Core Lab - III	24UMCAL3	Data Structures and Algorithms Lab	4	3	3	40	60	100
EC - III (Select any one)	24UECA31 24UECA32	1. Microprocessor and Microcontroller 2. Cyber Forensics	3	3	3	25	75	100
Part-IV SEC 4 - Lab	24USCAL3	PHP Programming Lab	2	2	3	40	60	100
Part - IV AEC - 1	24UACA31	Bootstrap and React	2	2	3	25	75	100
Part - IV	24UYOG31	Yoga, Culture & Heritage	2	2	1.5	25	75	100
Total			30	23				
❖ SEC- Skill Enhancement Course				CIA- Continuous Internal Assessment				
❖ EC- Elective Course				ESE- End Semester Examination				
❖ AEC- I (Ability Enhancement Course)								

**Course Structure for Science Stream
Second Year – Semester – IV
B.C.A**

(With effect from the academic year 2024– 2025 onwards)

Semester IV	Course Code	Title of the Course	Hours /Week L/P	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - I	24ULTL41	தமிழும் அறிவியலும்	6	3	3	25	75	100
Part - II	24ULEN41	General English - IV	6	3	3	25	75	100
Part - III Core - IV	24UMCA41	Java Programming	5	5	3	25	75	100
Core Lab - 4	24UMCAL4	Java Programming Lab	4	3	3	40	60	100
EC - IV (Select any one)	24UECA41 24UECA42	1. Financial Accounting 2. Cloud Computing	3	3	3	25	75	100
Part -IV SEC - V Lab - 4	24USCAL4	Multimedia Systems - Lab	2	2	3	40	60	100
Part - IV	24UEVS41	Environmental Studies	2	2	3	25	75	100
Part - IV AEC - II	24UACA41	Advanced Excel	2	2	3	25	75	100
Part - V	24UEA41	NCC/ NSS/ YRC/ SPORTS	-	1	-	-	-	100
		Total	30	24				
** SEC-Skill Enhancement Course			** CIA- Continuous Internal Assessment					
** EC -Elective Course			** ESE- End Semester Examination					

Course Structure for Science Stream
Third Year – Semester – V
B.C.A
(With effect from the academic year 2024 – 2025 on wards)

Semester V	Course Code	Title of the Course	Hours /Week	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - III Core - V	24UMCA51	Operating Systems	5	4	3	25	75	100
Core - VI	24UMCA52	ASP .Net Programming	4	4	3	25	75	100
Core - VII	24UMCA53	Data Analytics using R	5	4	3	25	75	100
Core - Lab - 5	24UMCAL5	ASP .Net Programming Lab	4	3	3	40	60	100
EC - V (Select any one)	24UECA51	1. Software Project Management	4	3	3	25	75	100
	24UECA52	2. MOOCs on SWAYAM						
EC - VI (Select any one)	24UECA53	1. AI and its Applications	4	3	3	25	75	100
	24UECA54	2. Machine Learning						
Part - IV AEC - III	24UACA51	Enhancing the Programming Skills	2	2	3	25	75	100
Part – IV Training	24UINT51	*Internship	-	2	-	50	50	100
Part - V	24UPDT51	Personality Development	2	2	3	25	75	100
Total			30	27				

**** SEC - Skill Enhancement Course**

****CIA - Continuous Internal Assessment**

****EC – Elective Course**

**** ESE - End Semester Examination**

****AEC - Ability Enhancement Course**

***Internship – course duration - 7 to14 days (Report should be submitted & Viva Voce will be conducted for the report which is equivalent to the project Viva – voce).**

Course Structure for Science Stream
Third Year – Semester – VI
B.C.A
(With effect from the academic year 2024 – 2025 on wards)

Semester VI	Course Code	Title of the Course	Hours /Week	Credit	Duration of ESE (Hrs.)	Marks Allotted		
						CIA	ESE	Total
Part - III Core - VIII	24UMCA61	RDBMS with PL/SQL	5	5	3	25	75	100
Core - IX	24UMCA62	Image Processing	5	4	3	25	75	100
Core – Lab - 6	24UMCAL6	RDBMS with PL/SQL Lab	5	3	3	40	60	100
Project - 1	24UMCAP1	Project with Viva Voce	5	3	3	50	50	100
EC - VII (Select any one)	24UECA61 24UECA62	1. Robotics and Its Applications 2. Computer Networks	4	3	3	25	75	100
EC - VIII (Select any one)	24UECA63 24UECA64	1. Introduction to Data Science 2. Data Mining and Warehousing	4	3	3	25	75	100
Part - IV AEC - IV	24UACA61	MongoDB	2	2	3	25	75	100
		Total	30	23				
** SEC - Skill Enhancement Course			**CIA - Continuous Internal Assessment					
**EC – Elective Course			** ESE - End Semester Examination					
**AEC - Ability Enhancement Course								

Semester - I Python Programming

Title of the Course	Python Programming				
Core - I	Year I	Semester I	Course Code 24UMCA11	Credits 5	Hours 5

Course Objectives:

1. To introduce students to the fundamental concepts of programming using Python.
2. To develop problem-solving skills through algorithmic thinking and coding.
3. To teach Python syntax, control structures, functions, and data structures.
4. To provide hands-on experience in developing simple Python applications.
5. To prepare students for advanced topics in data science, AI, or web development.

Syllabus

Unit - I Introduction to Python 15 Hours

History of Python. Installing Python and IDEs. Writing and running Python scripts. Python syntax, keywords, variables. Data types and type conversions. Input/output operations

Unit - II Data Types, Control Flow & Iteration 15 Hours

Built-in data types: int, float, bool, str. Type conversion and casting. Input/output functions. Conditional Statements: if, if-else, if-elif-else. Loops: for, while, nested loops. Loop control: break, continue, pass, else with loop

Unit - III: Functions and Modular Programming 15 hours

Defining and calling functions. Function arguments: positional, keyword, default, variable-length return statement. Recursion and lambda expressions. Scope and lifetime of variables. Built-in functions vs. user-defined functions. Importing and creating modules. Python standard libraries (math, random, time)

Unit -IV: Python Data Structures 15 Hours

Lists: creation, indexing, slicing, methods. Tuples: immutability, unpacking. Sets: uniqueness, set operations. Dictionaries: key-value pairs, nested dictionaries. Iterating over data structures. List comprehensions and dictionary comprehensions

Unit –V: File Handling and Exception Management

15 Hours

Working with files: open (), read/write/append modes. Reading from and writing to text files. File object methods: read (), readline(), readlines(), write().CSV file operations using csv module. Exception handling: try, except, else, finally. Built-in exceptions and raising exceptions manually

Books for Study:

1. E. Balagurusamy – Introduction to Python Programming, McGraw-Hill Education (1st Edition, 2017)
2. Reema Thareja – Python Programming: Using Problem Solving Approach, Oxford University Press (1st Edition, 2017)
3. Dr. R. Nageswara Rao – Core Python Programming, Dream Tech Press (1st Edition, 2018)
4. Mark Lutz – Learning Python, O'Reilly Media (5th Edition, 2013)
5. Tony Gaddis – Starting Out with Python, Pearson Education (5th Edition, 2018)

Books for Reference:

1. Zed A. Shaw – Learn Python the Hard Way, Addison-Wesley (3rd Edition, 2013)
2. Paul Barry – Head First Python, O'Reilly Media (2nd Edition, 2016)
3. Allen B. Downey – Think Python, Green Tea Press (2nd Edition, 2015)
4. Ashok Namdev Kamthane – Programming and Problem Solving with Python, Pearson (1st Edition, 2018)
5. Satya Prakash Singh – Python Programming, Katson Publishing House (1st Edition, 2021)

Web Resources

1. https://www.w3schools.com/datascience/ds_python.asp
2. <https://www.geeksforgeeks.org/data-science-with-python-tutorial/>
3. <https://www.learnpython.org/>
4. <https://www.simplilearn.com/tutorials/python-tutorial>

Course Outcomes

Course outcomes: CO	On completion of this course, the students will be able to:
C01	Understand the syntax and semantics of Python.
C02	Write Python programs using variables, control flow, and functions.
C03	Use built-in data structures such as lists, tuples, dictionaries, and sets.
C04	Apply file handling and exception handling techniques.
C05	Create basic Python applications using modular programming.

Mapping with Programme Outcomes CO – PO – PSO

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	2	1	2	1	3	2	2
C02	3	3	2	2	3	1	3	2	2
C03	3	3	3	2	3	2	3	3	2
C04	3	3	3	3	3	2	3	3	3
C05	3	3	2	3	3	2	3	3	3
Average	3.00	2.80	2.40	2.20	2.80	1.60	3.00	2.60	2.40

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Python Programming – Lab

Title of the Course	Python Programming - Lab				
Core Lab - I	Year I	Semester I	Course Code 24UMCAL1	Credits 4	Hours 5

Course Objectives

1. To provide practical experience with Python programming concepts and techniques.
2. To enable students to work on projects that reinforce programming concepts learned in the theory course.
3. To develop debugging and testing skills while working with Python.
4. To provide hands-on experience in solving real-world problems using Python.

Course Modules

Module	Topics Covered
Module I	1. Write a Python program to swap two variables.
Module II	2. Write a Python program to check if a number is even or odd. 3. Write a Python program to find the largest among three numbers. 4. Write a Python program to find factorial of a number using recursion.
Module III	5. Write a Python program to generate Fibonacci series up to n terms. 6. Write a Python program to check whether a string is palindrome or not.
Module IV	7. Write a Python program to count the number of vowels in a given string. 8. Write a Python program to check if a given number is a prime number.
Module V	9. Write a Python program to display the multiplication table of a given number. 10. Write a Python program to find the sum and average of elements in a list. 11. Write a Python program to perform linear search in a list. 12. Write a Python program to sort a list using bubble sort. 13. Write a Python program to demonstrate the use of dictionaries. 14. Write a Python program to remove duplicate elements from a list. 15. Write a Python program to count the occurrence of each word in a string.

References

1. **Zed Shaw**, "Learn Python the Hard Way", Addison-Wesley, 2014.
2. **Eric Matthes**, "Python Crash Course: A Hands-On, Project-Based Introduction to Programming", No Starch Press, 2016.
3. **Michael Dawson**, "Python Programming for the Absolute Beginner", Cengage Learning, 2010.
4. **Al Sweigart**, "Automate the Boring Stuff with Python", No Starch Press, 2015.
5. **Mark Lutz**, "Learning Python", O'Reilly Media, 2013.

Course Outcomes

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

Course Outcome (CO)	Cognitive Ability	Description
CO1	Applying	Implement basic Python programs and solve computational problems in a lab setting.
CO2	Understanding	Understand how Python can be used to manipulate data, handle exceptions, and perform tasks programmatically.
CO3	Creating	Develop Python-based applications and scripts that solve real-world problems.
CO4	Analyzing	Debug Python programs, identify issues, and improve code quality.
CO5	Evaluating	Evaluate and optimize Python code for performance and functionality.

Mapping with Programme Outcomes CO - PO - PSO

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	2	1	2	1	3	2	2
C02	3	3	3	2	3	1	3	2	2
C03	3	3	3	3	3	2	3	3	2
C04	3	3	3	3	3	2	3	3	3
C05	3	3	3	3	3	2	3	3	3
Avg	3.00	2.80	2.80	2.40	2.80	1.60	3.00	2.60	2.40

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Discrete Mathematics

Title of the Course	Discrete Mathematics				
Elective -I	Year I	Semester I	Course Code 24UECA11	Credits 3	Hours 4

Learn Objectives:

1. To recall basic concepts for clear understanding of mathematical principles.
2. To explain practical problems.
3. To construct matrices using discrete mathematics.
4. To analyse techniques to draw graph using mathematics.
5. To design graphs using the representations.

UNIT	CONTENTS
I	RELATIONS Introduction to Relations – Binary relation – Classification of Relations – Composition of Relations – Inverse of Relation – Closure operation on Relations – Matrix representation of Relation - digraphs.
II	FUNCTIONS Introduction to Functions – Addition and Multiplication of Functions- Classifications of Functions – Composition of Function – Inverse Function.
III	MATHEMATICAL LOGIC Introduction – Statement (Propositions) – Laws of Formal Logic –Basic Set of Logical operators/operations - Propositions and Truth Tables – Algebra Propositions - Tautologies and Contradictions – Logical Equivalence – Logical Implication – Normal Forms.
IV	MATRIX ALGEBRA Introduction – Definition of a Matrix - Types of Matrices – Operations on Matrices – Related Matrices – Transpose of a Matrix – Symmetric and Skew-symmetric Matrices –Complex Matrix– Conjugate of a Matrix – Determinant of a Matrix – Typical Square Matrices – Adjoint and Inverse of a Matrix – Singular and Non-singular Matrices – Adjoint of a Square Matrix – Properties of Adjoint of a Matrix – Properties of Inverse of a Matrix.
V	GRAPH Introduction – Graph and Basic Terminologies – Types of Graphs – Sub Graph and Isomorphic Graph – Operations on Graphs – Representation of Graph.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	DISCRETE MATHEMATICS, Swapan Kumar Chakraborty and Bikash Kanti Sarkar, OXFORD University Press.
Reference books:	<ol style="list-style-type: none"> 1. Discrete Mathematics, Third Edition, Seymour Lipschutz and Marc Lars Lipson, Tata McGraw Hill Education Private Limited. 2. Discrete Mathematical Structures with Applications to Computer Science by J.P.Tremblay, R.Manohar TMH edition

Course Outcomes:

Course outcomes: CO	On completion of this course, the students will be able to:
C01	To understand the concepts of relations and functions
C02	To analyse and evaluate the relations
C03	To distinguish among various normal forms
C04	To solve and know various types of matrices
C05	To evaluate and solve various types of graphs

Mapping with Programme Outcomes CO – PO – PSO

CO/PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	3	2	2	1	3	2	2
C02	3	3	2	2	3	1	3	3	2
C03	3	3	3	3	2	2	3	3	3
C04	3	2	3	3	3	2	3	3	2
C05	2	3	2	3	2	1	3	3	3
Average	2.80	2.60	2.60	2.60	2.40	1.40	3.00	2.80	2.40

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Numerical Methods

Title of the Course	Numerical Methods				
Elective - I	Year I	Semester I	Course Code 24UECA12	Credits 3	Hours 4

Learn Objectives:

1. Obtain numerical solutions of algebraic and transcendental equations.
2. Solve system of linear equations numerically using direct and iterative methods.
3. Solve ordinary differential equations.
4. Compute integration using Simpson's & Trapezoidal Rule.
5. Apply numerical methods in real life problems.

UNIT	CONTENTS
I	Curve Fitting: Introduction, Method of Least squares, Curve Fitting, Fitting a Straight Line.
II	Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Newton Raphson Method
III	Solution of Simultaneous Linear Equations: Solution of Simultaneous Linear Equations: Gauss Elimination method, Gauss-Jordan method, Gauss Seidel Method, Jacobi's method.
IV	Numerical Differentiation & Integration: Differentiation: Using Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only Integration: Using Trapezoidal rule, Simpson's 1/3 & Simpson's 3/8 rules
V	Solution of Ordinary Differential Equations: Runge-Kutta 2nd Order and 4th Order methods, Predictor-Corrector Methods: Milne and Adam's methods

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Jeffrey R. Chasnov, Numerical Analysis, The Hong Kong University of Science and Technology, Copyright c© 2012 by Jeffrey Robert Chasnov
Reference books:	1. K. E. Atkinson, An Introduction to Numerical Analysis (2nd edition), Wiley-India, 1989. 2. S. D. Conte and Carl de Boor, Elementary Numerical Analysis - An Algorithmic Approach (3rd edition), McGraw-Hill, 1981.

Course Outcomes (CO):

Course outcomes: CO	On completion of this course, the students will be able to:
CO1	To understand the concepts of curve fitting
CO2	To analyze and evaluate the Transcendental Equations
CO3	To understand the Solution of Simultaneous Linear Equations
CO4	To solve Numerical Differentiation & Integration
CO5	To evaluate Ordinary Differential Equations

Mapping with Programme Outcomes CO - PO - PSO

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	2	1	2	1	3	2	2
C02	3	3	2	2	3	1	3	2	2
C03	3	3	3	2	3	2	3	3	2
C04	3	3	3	3	3	2	3	3	3
C05	3	3	2	3	3	2	3	3	3
Average	3.00	2.80	2.40	2.20	2.80	1.60	3.00	2.60	2.40

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Office Automation Lab

Title of the Course	Office Automation Lab				
Skill Enhancement Course - I - Lab - 1	Year I	Semester I	Course Code 24USCAL1	Credits 2	Hours 2

Learning Objectives

L01	Understand the basics of computer systems and its components.
L02	Understand and apply the basic concepts of a word processing package.
L03	Understand and apply the basic concepts of electronic spreadsheet software.
L04	Understand and create a presentation using Power Point tool.
L05	Understand and apply the basic concepts of database management system.

EXERCISES

MS – Word

1. Prepare a word document for Spell checking and Thesaurus.
2. Find a word and Replace with another in a document.
3. Insert Header with College Name, Footer with Page No., and Footnote in a document.
4. Insert mathematical symbols using Microsoft equation 3.0.
5. Preparing Newspaper format (Apply Alignment, Font, Property, Line spacing, Picture Format).
2. Prepare a Bio-Data and insert the contents of qualification within the table.
3. Mail Merge

MS – Excel

1. Apply formulas and functions.
2. Prepare a chart for population growth.
3. Apply ascending and descending order.
4. Apply auto format.

MS – PowerPoint

1. Create a power point presentation with 3 slides.
2. Create a design template with 3 slides.
3. Create a presentation with animation.
4. Create a power point presentation with 4 slides. Set slide transition time of 3 seconds and display your presentation

MS – Access

1. Create an employee database.
2. Create a mark statement for a class of 20 students. Find total and average marks. Give proper headings.
3. Create a report.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> Office Automation (Sem 1, NEP) Girija D. K., Rashmi M., Shilpa H.K.
Reference Books:	<ol style="list-style-type: none"> Learning Microsoft Office 97: Word, Excel, Powerpoint, Access : Professional Version Hardcover – Import, 1 July 1997 by Iris Blanc (Author), Cathy Vento (Author)
Web resources:	https://www.udemy.com/course/office-automation-certificate-course https://www.javatpoint.com/automation-tools

Course outcomes	On completion of this course, students will be able to:
C01	Preparation of word document
C02	Preparation of excel sheet
C03	Preparing sliding show
C04	Create data base and understand all manipulation operation
C05	Understand all concepts in Ms-office

Mapping with Programme Outcomes CO – PO – PSO

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	2	1	2	1	3	2	2
C02	3	3	2	2	3	1	3	2	2
C03	3	3	3	2	3	2	3	3	2
C04	3	3	3	3	3	2	3	3	3
C05	3	3	2	3	3	2	3	3	3
Average	3.00	2.80	2.40	2.20	2.80	1.60	3.00	2.60	2.40

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Fundamentals of Information Technology

Title of the Course	Fundamentals of Information Technology				
Foundation Course	Year I	Semester I	Course Code 24UFCA11	Credits 2	Hours 2

Course Objectives:

1. Understand the basic concepts and terminology of information technology
2. Be able to identify data storage and its usage
3. Have a basic understanding of personal computers and their operation
4. Get great knowledge of software and its functionalities
5. Understand about operating systems and their uses

Syllabus

Unit I: Introduction to Computers

6 Hours

Introduction, Definition, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Capabilities and limitations of computer.

Unit II: Basic Computer Organization

6 Hours

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, and Output Units: Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Unit III: Storage Fundamentals

6 Hours

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives

Unit IV: Storage**6 Hours**

Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS

Unit V: Operating System**6 Hours**

Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

Books for Study:

1. Anoop Mathew, S. Kavitha Murugesan (2009), "Fundamental of Information Technology", Majestic Books.
2. Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.
3. K Bansal, "Fundamental of Information Technology"

Books for Reference:

1. Bhardwaj Sushil Puneet Kumar, "Fundamental of Information Technology"
2. GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell
3. A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing

Web Resources:

- <https://testbook.com/learn/computer-fundamentals>
- <https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html>
- <https://www.javatpoint.com/computer-fundamentals-tutorial>
- https://www.tutorialspoint.com/computer_fundamentals/index.htm
- <https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf>

Course Outcomes:

CO No.	Course Outcome (CO)
C01	Understand and apply concepts of linear algebra, including matrices, vector spaces, eigenvalues, and SVD in AI models.
C02	Analyze probability and statistics principles to model uncertainty and randomness in AI.
C03	Implement optimization techniques, including gradient descent and convex optimization, for AI applications.
C04	Apply calculus concepts like differentiation, integration, and backpropagation in deep learning models.
C05	Utilize discrete mathematics and graph theory for AI applications such as search algorithms and Markov models.

Mapping with Programme Outcomes CO - PO - PSO

CO/PO	P01	P02	P03	P04	P05	P06	P07
C01	3	2	3	2	2	3	2
C02	3	3	2	2	3	3	2
C03	3	3	3	3	2	3	2
C04	3	2	3	3	3	3	2
C05	2	3	2	3	2	2	2
C06	3	2	3	2	2	3	2
Average	2.80	2.60	2.60	2.60	2.40	1.40	2

Strong - 3 Moderate -2 Weak-1 No Correlation-0

CO/PO	PSO1	PSO2	PSO3	PSO4
C01	3	2	2	3
C02	3	3	2	3
C03	3	3	3	3
C04	3	3	2	3
C05	3	3	3	3
C06	3	2	2	3
Average	3.00	2.80	2.40	3.00

Semester - II
Object Oriented Programming with C++

Title of the Course		Object Oriented Programming With C++					
Course Type		Core - II					
Year	I	Semester	II	Credits	5	Course Code	24UMCA21
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	2		--		5
Learning Objectives							
L01	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects						
L02	Understand dynamic memory management techniques using pointers, constructors, destructors, etc.						
L03	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism						
L04	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming						
Unit	Contents						
I	Introduction to C++ - key concepts of Object-Oriented Programming - Advantages - Object Oriented Languages - I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If... else, jump, go to, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions - Function Overloading						
II	Classes and Objects: Declaring Objects - Defining Member Functions - Static Member variables and functions - array of objects - friend functions - Overloading member functions - Constructor and destructor with static members.						
III	Operator Overloading: Overloading unary, binary operators - Overloading Friend functions - type conversion - Inheritance: Types of Inheritance - Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance - Virtual base Classes - Abstract Classes.						
IV	Pointers - Declaration - Pointer to Class, Object - this pointer - Pointers to derived classes and Base classes - Arrays - Characteristics - array of classes - Memory models - new and delete operators - dynamic object - Binding, Polymorphism and Virtual Functions.						
V	Files - File stream classes - file modes - Sequential Read / Write operations - Random Access Operation - String - Declaring and Initializing string objects - String Attributes - string functions						

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts:	
1	E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition
References Books:	
1	Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2	Maria Litvin & Gray Litvin, “C++ for you”, Vikas publication 2002.

Course outcomes	On completion of this course, students will be able to:
C01	Remember the program structure of C++ with its syntax and semantics
C02	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)
C03	Apply the programming principles learnt in real-time problems
C04	Analyze the various methods of solving a problem and choose the best method
C05	Code, debug and test the programs with appropriate test cases

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Object Oriented Programming with C++ Lab

Title of the Course	Object Oriented Programming With C++ Lab						
Course Type	Core Lab - II						
Year	I	Semester	II	Credits	4	Course Code	24UMCAL2
Instructional Hours Per week		Lecture	Tutorial		Lab Practice		Total
		1	-		4		5
Learning Objectives							
L01	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.						
L02	Understand dynamic memory management techniques using pointers, constructors, destructors, etc.						
L03	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.						
L04	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.						
L05	Demonstrate the use of various OOPs concepts with the help of programs.						

Experiments

1. Write a C++ program to demonstrate Class and Objects
2. Write a C++ program to demonstrate the concept of Passing Objects to Functions
3. Write a C++ program to demonstrate function overloading
4. Write a C++ program to demonstrate Friend Functions.
5. Write a C++ program to demonstrate Constructor and Destructor
6. Write a C++ program to demonstrate Unary Operator Overloading.
7. Write a C++ program to demonstrate Binary Operator Overloading
8. Write a C++ program to demonstrate:
 - Single Inheritance
 - Multilevel Inheritance
 - Multiple Inheritance
9. Write a C++ program to manipulate a Text File
10. Write a C++ program to demonstrate Virtual Functions.
11. Write a C++ program to perform Sequential I/O Operations on a file.
12. Write a C++ program to find the Biggest Number using Command Line Arguments

Extended Professional Component(is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.
Reference Books:	<ol style="list-style-type: none"> 1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003. 2. Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.
Web resources:	https://alison.com/course/introduction-to-c-plus-plus-programming

Course outcomes	On completion of this course, students will be able to:
C01	Remember the program structure of C++ with its syntax and semantics.
C02	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files).
C03	Apply the programming principles learnt in real-time problems
C04	Analyse the various methods of solving a problem and choose the best method
C05	Code, debug and test the programs with appropriate test cases

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	3	3	3
C02	3	3	2	3	2	3	3	2
C03	3	2	3	3	2	1	2	3
C04	2	3	3	3	3	3	3	3
C05	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Digital Logic Fundamentals

Title of the Course		Digital Logic Fundamentals					
Course Type		Elective - II					
Year	I	Semester	II	Credits	3	Course Code	24UECA21
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		3	1		-	4	
Learning Objectives							
L01	Understand the concept number system algebraic operations						
L02	Analyse the usage of logic gates.						
L03	Implement the combinational circuits.						
L04	Apply the sequential logic.						
L05	Analyze the organization of memory and registers						

Unit	Contents
I	<p>Digital System and binary numbers: Digitalsystems–binarynumbers–numberbaseconversion–Octalandhexadecimalnumbers–complements–signedbinary numbers–binary codes–binary storage and registers –binary logic.</p> <p>Boolean algebra: Introduction–basic definition– axiomatic definition of Boolean algebra– basic theorem and properties and of Boolean algebra – Boolean functions.</p>
II	<p>Logic gates: Canonical and standard forms –other logic operations –digital logic gates and integrated circuits.</p> <p>NAND and NOR implementation- other two level implementations – Exclusive OR Functions...</p>
III	<p>Gate-Level minimization: Introduction: The Mapmethod–Four-variableMaps–Five-variableMap–Product-of-sumssimplifications-Don't conditions.</p>
IV	<p>CombinationalLogic:Introduction–Combinationalcircuits–AnalysisProcedure– DesignProcedure–BinaryAdder–Subtractor–DecimalAdder–BinaryMultiplier– MagnitudeComparator</p>
v	<p>Combinational Logic: Decoders-Encoders–Multiplexers.</p> <p>Synchronous Sequential Logic: Introduction –Sequential Circuits – Storage Element Latches - Storage Element Flip- Flops – Analysis of Clocked Sequential Circuits.</p>

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Digital Design –Fourth Edition –M. Morris Mano, Michael D Ciletti,-Prentice Hall of India Pvt Ltd., 2007
Reference books:	1. Digital Principles and Applications–Albert Paul Malvino, Donald Leach, Tata M.C. Graw-Hill Publishing Company Ltd. 2. Digital Principles and Design–Donald D. Givone, Tata McGraw-Hill Publishing Company Limited
Web Resources	https://learn.sparkfun.com/tutorials/digital-logic/all

Course outcomes	On completion of this course, students will be able to:
C01	Know the definition of digital logics and circuits.
C02	Understand the digital devices.
C03	Understand the digital arithmetic circuits.
C04	Acquire Knowledge on basics of Gates and its Applications.
C05	Have the necessary understanding on Registers for Counting Applications.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	2	3	2	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Optimization Techniques

Title of the Course		Optimization Techniques					
Course Type		Elective - II					
Year	I	Semester	II	Credits	3	Course Code	24UECA22
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	1		-		4
Pre-requisite							
Learning Objectives							
L01	Formulate and solve Linear Programming Problems						
L02	Analyse the usage of Assignment Problems.						
L03	Evaluate Transportation Models.						
L04	Apply PERT and CPM techniques to find the optimal solution.						
L05	Evaluate optimum duration and minimum duration cost						

Unit	Contents
I	Introduction Operations Research The Nature and Meaning of OR–Management–Applications of OR– Modeling in OR– General methods for solving OR models– Scope of OR – Advantages and disadvantages of OR
II	Linear Programming Problem Linear Programming Problem: Formulation of LP problem Graphical solution of LP problems– General formulation of LPP–Slack and Surplus variables–Standard form of LPP
III	Assignment problems Assignment Problem: Mathematical formulation–Hungarian method– Unbalanced assignment problem–Various types
IV	Pert and cpm techniques PERT and CPM Techniques: Basic Steps–Network Diagram presentation– Rules for drawing Network Diagram– Labeling Fulkerson’s I– J Rule– Time Estimates and Critical Path in Network Analysis – Examples on optimum duration and minimum duration cost –Pert.

V	Pert and cpm techniques PERT and CPM Techniques: Basic Steps–Network Diagramed presentation– Rules for drawing Network Diagram– Labeling Fulkerson’s – J Rule– Time Estimates and Critical Path in Network Analysis – Examples on optimum duration and minimum duration cost –PERT
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	S.D.Sharma,“OperationsResearch”,TenthEdition,Pearson,2017
Reference books:	1. Hamdy A Taha,“Operations Research ”Ninth Edition, Pearson, 2016. 2.V.Sundaresan,K.S.GanapathySubramanian,K. Ganesan,“Resource Management Techniques”,NinthEdition,A.R.Publications,2015

Web Resources	https://onlinecourses.nptel.ac.in/noc22_ma48/preview https://www.geeksforgeeks.org/real-life-application-of-math-in-operation-research/
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Course outcomes: CO	On completion of this course, the students will be able to:
CO1	Obtain solution of LPP
CO2	Evaluate Graphical solution of LPP
CO3	Obtain solution of Assignment problem
CO4	Evaluate Transportation problem
CO5	Evaluate PERT and CPMT techniques

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Web Design

Title of the Course		Web Design					
Paper Number		Skill Enhancement Course - II					
Year	I	Semester	II	Credits	2	Course Code	24USCA21
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		2	-		-	2	
Learning Objectives							
L01	Understand the basics of HTML and its components						
L02	To study about the Graphics in HTML						
L03	Understand and apply the concepts of DHTML						
L04	Understand the concept of PHP						
L05	To identify and understand the goals and objectives of the PHP functions						
Unit	Contents						
I	HTML: HTML-Introduction-tag basics-page structure-adding comments-working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-Alignment links-tables-frames.						
II	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in webpages, image maps, GIF animation, adding multimedia, data collection with html forms –form elements- what is CSS - adding CSS to your webpages - Building webpage front page						
III	JavaScript - Introduction to JavaScript - Variable - Operator- Conditional Statement - Function – Methods. DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages.						
IV	Embedding HTML with Java Script - Creating the Web Pages - validating elements using JavaScript with HTML- Binding of CSS and JavaScript with HTML.						
V	PHP Programming Basics-Syntax of PHP Embedding PHP in HTML - Embedding HTML in PHP. Introduction to PHP Variable-Understanding Data Types Using Operators-Using Conditional Statements If (), else if () and else if condition Statement. Switch () Statements -Using the while () Loop -Using for () Loop PHP Functions. PHP Functions.						

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	<ol style="list-style-type: none"> 1. Pankaj Sharma,-Web Technology, Sk Kataria & Sons Bangalore 2011. 2. Head First PHP & MySQL: A Brain-Friendly Guide Oreilly 2009-Lynn Beighley and Michael Morrison. 3. The Joy of PHP:A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL-Alan Forbes
Reference books	<ol style="list-style-type: none"> 1. Viswam Vaswani-PHP and MYSQL-McGraw-Hill-2005 2. Steven Holzner-The Complete reference PHP, Tata Graw Hill, 2008 3. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, -Mastering HTML, CSS & Java Script Web Publishing , 2016. 4. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL-Alan Forbes 3. DT Editorial Services (Author), -HTML5 Black Book (Covers CSS3, JavaScript, XML, HTML, AJAX, PHP, j Query) , Paper back 2016, 2nd Edition.
Web Resources	<ol style="list-style-type: none"> 1. NPTEL & MOOC course stilted Web Design and Development 2. https://www.geeksforgeeks.org 3. Refer MOOC Courses like NPTEL and SWAYAM 4. https://www.w3schools.com/php/default.asp

Course outcomes CO	On completion of this course, the students will be able to
CO1	Develop working knowledge of HTML
CO2	Learn to Develop Web pages using Hypertext Mark-up Language (HTML).
CO3	Have the ability to optimize page styles and layout with Cascading Style Sheets (CSS).
CO4	Develop PHP programs
CO5	Get knowledge to develop PHP functions

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	2	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

HTML Lab

Title of the Course	HTML Lab						
Course Type	Skill Enhancement Course - III - Lab						
Year	I	Semester	II	Credits	2	Course Code	24USCAL2
Instructional Hours Per week	Lecture		Tutorial		Lab Practice		Total
	-		-		2		2
Pre-requisite							
Learning Objectives							
L01	Insert a graphic within a web page.						
L02	Create a link within a web page.						
L03	Create a table within a web page.						
L04	Insert heading levels within a web page.						
L05	Insert ordered and unordered lists within a web page.						

Experiments

1. Create a website using internal links and images.
2. Design a calendar using table tag.
3. Create a HTML document to display a list of five flowers and link each one to another document displaying brief description of the flower, Add pictures wherever possible.
4. Write a HTML code to display a list of 5 cars in a frame, link each one to a brief description in second frame. The left frame should display the list and the right frame should display the paragraph about the frame.
5. Create a simple HTML Form covering major form elements.
6. Embed Audio and Video in a HTML page.
7. Rotate an element using CSS.
8. Build a simple quiz.
9. Create web page using form and doing validation.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)

Questions related to the above topics, from various competitive examinations UPSC / TRB /NET / UGCCSIR / GATE / TNPSC/others to be solved (To be discussed during the Tutorial hour)

Skills acquired from this course

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	“Mastering HTML5 and CSS3 Made Easy”, Teach U Comp Inc., 2014.
Reference Books:	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”
Web resources:	<ol style="list-style-type: none"> 1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf 2. https://www.w3schools.com/html/default.asp

Course outcomes	On completion of this course, students will be able to:
C01	Know the basic concept in HTML. Concept of resources in HTML
C02	Know Design concept, Concept of Forms. Understand the concept of save the files
C03	Understand the page formatting. Concept of CSS
C04	Creating Links. Know the concept of embedding audio and video in a page.
C05	Understand the table creation.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Semester - III
Data Structures and Algorithms

Title of the Course		Data Structures and Algorithms				
Course Type		Core - III				
Course Code		24UMCA31				
Year	II	Semester	III	Credits	5	
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total
		3	2		--	5
Learning Objectives						
L01	To understand the concepts of ADTs					
L02	To learn linear data structures-lists, stacks, queues					
L03	To learn Tree structures and application of trees					
L04	To learn graph structures and application of graphs					
L05	To understand various sorting and searching					

Unit	Contents
I	Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists- All operations-Insertion-Deletion-Traversal.
II	Stack ADT-Operations-Applications-Evaluating arithmetic expressions-Conversion of infix to postfix expression- Queue ADT - Operations-Circular Queue- Priority Queue- DE Queue applications of Queues.
III	Tree ADT-tree traversals-Binary Tree ADT-expression trees- applications of trees-binary search tree ADT- AVL Trees – Heap-Applications of heap.
IV	Graph - Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal- Applications of graphs.
V	Searching- Linear search- Binary search-Sorting-Bubble sort- Selection sort-Insertion sort- Shell sort –Radix sort-Hashing-Hash functions-Separate chaining- Open Addressing-Rehashing.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts:	
1	Benjamin Baka, "Python Data Structures and Algorithms", Packt Publishing 2017, First Edition.
2	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms", Galgotia Publications pvt. Ltd, 2000.
3	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.
4	Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition
References Books:	
1	Rance D. Necaie, "Data Structures and Algorithms using Python", John Wiley & Sons, 2011
2	Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
Web Resources	
1	NPTEL & MOOC courses titled Data Structures
2	https://nptel.ac.in/courses/106106127/

Course outcomes	On completion of this course, students will be able to:
C01	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation
C02	Understand basic data structures such as arrays, linked lists, stacks and queues
C03	Describe the hash function and concepts of collision and its resolution methods
C04	Solve problem involving graphs, trees and heaps
C05	Apply algorithm for solving problems like sorting, searching, insertion and deletion of data

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Data Structures and Algorithms Lab

Title of the Course	Data Structures And Algorithms Lab				
Course Type	Core Lab - III				
Course Code	24UMCAL3				
Year	II	Semester	III	Credits	3
Instructional Hours Per week	Lecture	Tutorial		Lab Practice	Total
	1	-		3	4
Learning Objectives					
L01	To understand the concepts of ADTs				
L02	To learn linear data structures-lists, stacks, queues				
L03	To learn Tree structures and application of trees				
L04	To learn graph structures and application of graphs				
L05	To understand various sorting and searching				

EXPERIMENTS

1. Write a program to implement Stack ADT.
2. Write a program to implement Queue ADT
3. Write a program to implement linked list.
4. Write a program to convert from infix to postfix expression.
5. Write a program to implement binary search tree.
6. Write a program for the implementation of BFS and DFS for a given graph.
7. Write a program for implementing the linear search.
8. Write a program for implementing the Binary search.
9. Write a program for implementing the Selection sort.
10. Write a program for implementing the Insertion sort.

Extended Professional Component(is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC –CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Benjamin Baka, "Python Data Structures and Algorithms", Pack Publishing 2017, First Edition. 2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition 3. Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition
Reference Books:	<ol style="list-style-type: none"> 1. Thomas H. Cormen, Chales E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition
Web Resources	
1	NPTEL & MOOC courses titled Data Structures
2	https://nptel.ac.in/courses/106106127/

Course outcomes	On completion of this course, students will be able to:
C01	Understand the concept of Dynamic memory management, data types, algorithms
C02	Understand basic data structures such as arrays, linked lists, stacks and queues
C03	Describe the hash function and concepts of collision and its resolution methods
C04	Solve problem involving graphs, trees and heaps
C05	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	3	3	3
C02	3	3	2	3	2	3	3	2
C03	3	2	3	3	3	1	2	3
C04	2	3	3	3	3	3	3	3
C05	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Microprocessor and Microcontroller

Title of the Course	Microprocessor and Microcontroller				
Course Type	Elective - III				
Course Code	24UECA31				
Year	II	Semester	III	Credits	3
Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	
	2	1	-	3	
Learning Objectives					
L01	To introduce the internal organization of Intel 8085 Microprocessor.				
L02	To know about various instruction sets and classifications				
L03	To enable the students to write assembly language programs using 8085.				
L04	To interface the peripheral devices to 8085 using Interrupt controller and DMA interface				
L05	To provide real-life applications using microcontroller.				

Unit	Contents
I	Digital Computers - Microcomputer Organization-Computer languages – Microprocessor Architecture and its operations – Microprocessor initiated operations and 8085 Bus organization – Internal Data operations and 8085 registers - Peripheral or External initiated operations.
II	8085 Microprocessor – Pin out and Signals – Functional block diagram - 8085 Instruction Set and Classifications.
III	BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions. BCD Arithmetic - BCD addition and Subtraction – Multi byte Addition and Subtraction - Multiplication and Division.
IV	The 8085 Interrupts – RIM AND SIM instructions-8259 Programmable Interrupt Controller-Direct Memory Access (DMA) and 8257 DMA controller.
V	Introduction to Microcontroller - Microcontroller Vs. Microprocessor - 8051 Microcontroller architecture - 8051 pin description. Timers and Counters – Operating Modes- Control Registers. Interrupts – Interrupts in 8051 - Interrupts Control Register – Execution of interrupt.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	<ol style="list-style-type: none"> 1. R.S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085", 5th Edition- Penram International Publications, 2009. [For unit I to unit IV] 2. Soumitra Kumar Mandal - "Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051", Tata McGraw Hill Education Private Limited. [For unit V].
Reference books:	<p>Mathur- "Introduction to Microprocessor"- 3rd Edition- Tata McGraw-Hill -1993.</p> <p>Raj Kamal - "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.</p> <p>Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008</p>

Course outcomes: CO	On completion of this course, the students will Be able to:
C01	Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the Architecture of 8085.
C02	Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic.
C03	Apply different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multi byte arithmetic operations.
C04	Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller.
C05	Have an exposure to create real time applications using Micro controller.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Cyber Forensics

Title of the Course	Cyber Forensics				
Course Type	Elective - III				
Course Code	24UECA32				
Year	II	Semester	III		Credits 3
Instructional Hours per week	Lecture		Tutorial	Lab Practice	Total
	2		1	-	3
Learning Objectives					
L01	Understand the definition of computer forensics fundamentals				
L02	To study about the Types of Computer Forensics Evidence				
L03	Understand and apply the concepts of Duplication and Preservation of Digital Evidence				
L04	Understand the concepts of Electronic Evidence and Identification of Data				
L05	To study about the Digital Detective, Network Forensics Scenario, Damaging Computer Evidence.				

Unit	Contents
I	Overview of Computer Forensics Technology: Computer Forensics Fundamentals: What is Computer Forensics Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialist
II	Types of Computer Forensics Technology: Types of Business Computer Forensic, Technology: Computer Forensic Technology-Types of Military Computer Forensic Technology- Types of Business Computer Forensic Technology Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined, Data Back-up and Recovery, The Role of Back -up in Data Recovery, The Data -Recovery Solution.
III	Duplication and Preservation of Digital Evidence: Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication.
IV	Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.
V	Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Destruction Of E-Mail, Damaging Computer Evidence, Documenting The Intrusion on Destruction of Data, System Testing.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	John R. Vacca, "Computer Forensics: Computer Crime Investigation", 3/ E, Fire wall Media, New Delhi, 2002.
Reference books:	Nelson, Phillips Enfinger, Steuart, "Computer Forensics and Investigations" Enfinger, Steuart, CENGAGE Learning, 2004.
	Anthony Sammes and Brian Jenkinson,"Forensic Computing: A Practitioner's Guide", Second Edition, Springer-Verlag London Limited, 2007.
	.Robert M. Slade," Software Forensics Collecting Evidence from the Scene of a Digital Crime", TMH 2005.
Web Resources	https://www.vskills.in
	https://www.hackingarticles.in/best-of-computer-forensics-tutorials/

Course outcomes: CO	On completion of this course, the students will be able to:
CO1	Understand the definition of computer forensics fundamentals.
CO2	Evaluate the different types of computer forensics technology.
CO3	Analyze various computer forensics systems.
CO4	Apply the methods for data recovery, evidence collection and data seizure.
CO5	Gain the knowledge of duplication and preservation of digital evidence.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3)

M-Medium (2)

L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

PHP Programming Lab

Title of the Course	PHP Programming Lab				
Course Type	Skill Enhancement Course - IV - Lab				
Course Code	24USCAL3				
Year	II	Semester	III	Credits	2
Instructional Hours Per week	Lecture	Tutorial		Lab Practice	Total
	-	-		2	2
Learning Objectives					
L01	To provide the necessary knowledge on basics of PHP.				
L02	To design and develop dynamic, database-driven web applications using PHP.				
L03	To get an experience on various web application development techniques.				
L04	To learn the necessary concepts for working with the files using PHP.				
L05	To get a knowledge on sessions and cookies.				

Experiments

1. Get name of a user from a form and show greeting text.
2. Write a PHP program to check whether given string is palindrome or not.
3. Write a PHP program to check whether given number is Armstrong or not.
4. Write a PHP program using function.
5. Create a PHP page for login page without sql connection.
6. Write a PHP program for Array manipulation.
7. Write a PHP program to design personal information
8. Create a PHP page for login page with sql connection.
9. Create a web page to advertise a product of the company using images and audio.

<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p>Recommended Texts</p>	<ol style="list-style-type: none"> 1. Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison 2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes
<p>Reference Books:</p>	<ol style="list-style-type: none"> 1. PHP: The Complete Reference- Steven Holzner. 2. DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Edition.
<p>Web resources:</p>	<ol style="list-style-type: none"> 1. Refer MOOC Courses like NPTEL and SWAYAM 2. https://www.w3schools.com/php/default.asp

Course outcomes:	On completion of this course, the students will be able to	
CO		
C01		Write PHP scripts to handle HTML forms
C02		Write regular expressions including modifiers, operators, and meta characters.
C03		Create PHP Program using the concept of array.
C04		Create PHP programs that use various PHP library functions
C05	Manipulate files and directories.	

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PS0	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Bootstrap and React

Title of the Course	Bootstrap and React					
Course Type	Ability Enhancement Course - I					
Course Code	24UACA31					
Year	II	Semester	III	Credits	2	
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total
	1		1		-	2
Learning Objectives						
L01	Understand the Fundamentals of Bootstrap					
L02	Work with Bootstrap CSS					
L03	Work with Bootstrap Components					
L04	Explore the Bootstrap Java script plugins					
L05	To build an app using React					

Unit	Contents
I	Introduction: What Is Bootstrap? - Bootstrap File Structure - Basic HTML Template - Global Styles - Default Grid System - Basic Grid HTML - Offsetting Columns - Nesting Columns - Fluid Grid System - Container Layouts - Responsive Design - What Is Responsive Design?
II	Bootstrap CSS: Typography - Headings - Emphasis - Bold - Italics - Emphasis Classes - Lists - Code - Tables - Forms - Optional Form Layouts - Supported Form Controls - Form Control Sizing - Form Control States - Buttons - Images.
III	Bootstrap Layout Components: Dropdown Menus - Options - Button Groups - Button Groups as Radio Buttons and Checkboxes - Buttons with Dropdowns - Drop up Menus - Navigation Elements - Tabular Navigation - Dropdowns - Navigation Lists - Forms -- Labels - Alerts.
IV	Bootstrap Java Script Plugins: Overview - Programmatic API - Transitions - Modal - Usage - Options - Methods - Events. Using Bootstrap: GitHub Project - Customizing Bootstrap - Using LESS - Text Snippets - Photoshop Templates - Themes - Built with Bootstrap
V	Introduction of React: React without a Build Tool chain - Interactive "Hello, World" with Create React App and JSX. What's in a Name? - UI Layer - Virtual DOM - The Philosophy of React - React Is Declarative. JSX: What Is JSX? - How JSX Works - Syntax Basics of JSX - JSX Is JavaScript XML- Reserved Words - JSX Uses camelCase - JSX Boolean Attributes - Use Curly Braces to Include Literal JavaScript - When to Use JavaScript in JSX - Conditionals in JSX - Expressions in JSX - Using Children in JSX - React Fragments.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC - CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts	<ol style="list-style-type: none"> 1. Bootstrap, Jake Spurlock, O'REILLY 2. BEGINNING React JS Foundations, Building User Interfaces with React JS, AN APPROACHABLE GUIDE, Chris Minnick
Web Resources	<ul style="list-style-type: none"> • www.allitebooks.com • https://www.learnvern.com/bootstrap-tutorial • https://www.w3schools.com/REACT/DEFAULT.ASP
Course outcomes: CO	On completion of this course, the students will be able to:
C01	Understand the Fundamentals of Bootstrap
C02	Able to work with Bootstrap CSS
C03	Able to work with Bootstrap Components
C04	Implementing Bootstrap Java script plugins
C05	Building an app using React

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3)

M-Medium (2)

L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Semester - IV Java Programming

Title of the Course		Java Programming					
Course Type		Core - IV					
Year	II	Semester	IV	Credits	5	Course Code	24UMCA41
Instructional Hours Per week		Lecture	Tutorial		Lab Practice	Total	
		5			--	5	
Learning Objectives							
L01	To provide fundamental knowledge of object-oriented programming						
L02	To equip the student with programming knowledge in Core Java from the basics up.						
L03	To enable the students to use AWT controls, Event Handling and Swing for GUI.						
L04	To provide fundamental knowledge of object-oriented programming.						
L05	To equip the student with programming knowledge in Swing.						
Unit	Contents						
I	Introduction: Review of Object Oriented concepts – History of Java – Java buzz words – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.						
II	Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-Access Protection -Importing Packages. Interfaces: Definition–Implementation–Extending Interfaces. Exception Handling: try – catch - throw - throws – finally – Built-in exceptions - Creating own Exception classes.						
III	Multithreaded Programming: Thread Class - Runnable interface –Synchronization– Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock. I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.						
IV	AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers.						
V	Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes						

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts:	
1	1. Herbert Scheldt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
2	2. Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999
References Books:	
1	1. Head First Java, O'Reilly Publications
2	2. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010
Web Resources:	
1	https://javabeginnerstutorial.com/core-java-tutorial http://docs.oracle.com/javase/tutorial/ https://www.coursera.org/

Course outcomes	On completion of this course, students will be able to :
C01	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.
C02	Implement inheritance, packages, interfaces and exception handling of Core Java.
C03	Implement multi-threading and I/O Streams of Core Java
C04	Implement AWT and Event handling.
C05	Use Swing to create GUI.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Java Programming Lab

Title of the Course	Java Programming Lab						
Course Type	Core - Lab - IV						
Year	II	Semester	IV	Credits	3	Course Code	24UMCAL4
Instructional Hours Per week		Lecture	Tutorial		Lab Practice		Total
		-	-		4		4
Learning Objectives							
L01	To provide fundamental knowledge of object-oriented programming						
L02	To equip the student with programming knowledge in Core Java from the basics up.						
L03	To enable the students to use AWT controls, Event Handling and Swing for GUI.						
L04	To provide fundamental knowledge of object-oriented programming.						
L05	To equip the student with programming knowledge in Swing.						

Experiments

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer
2. Write a Java program to multiply two given matrices.
3. Write a Java program that displays the number of characters, lines and words in text.
4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.
5. Write a program to perform String Manipulation.
6. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
7. Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.
8. Write a program to demonstrate the use of following exceptions.
 - a. Arithmetic Exception
 - b. Number Format Exception
 - c. Array Index Out of Bound Exception
 - d. Negative Array Size exception
- 9 Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).
10. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Herbert Scheldt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010 Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
Reference Books:	Head First Java, O’ Reilly Publications
Web resources:	https://www.w3schools.com/java/ http://java.sun.com

Course outcomes	On completion of this course, students will be able to:
C01	Understand the basic Object-oriented concepts. Implement the Basic constructs of Core Java.
C02	Implement inheritance, packages, interfaces and exception handling of Core Java.
C03	Implement multi-threading and I/O Streams of Core Java
C04	Implement AWT and Event handling.
C05	Use Swing to create GUI.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Financial Accounting

Title of the Course		Financial Accounting					
Course Type		Elective					
Year	II	Semester	IV	Credits	3	Course Code	24UECA41
Instructional Hours per week		Lecture	Tutorial	Lab Practice		Total	
		3	-	-		3	
Learning Objectives							
L01	To impart basic accounting knowledge.						
L02	To provide knowledge on the fundamentals of financial accounting.						
L03	To expose the student to various financial transactions and its current applications.						
L04	To impart basic Trial Balance.						
L05	To provide knowledge on the fundamentals of receipts and payments account						
Unit	Contents						
I	Basic Concepts Of Accounting Introduction to Accounting : Need for Accounting –Accounting as the language of business – Attributes and steps of Accounting –Book keeping Vs Accounting – Branches of Accounting– Methods of Accounting – Types of Accounting – Accounting Rules - Bases of Accounting – Accounting terminology. Basic Accounting Concepts: Meaning and classification of Accounting- Accounting Concepts – Accounting Conversion – Accounting equations.						
II	Journal And Ledger Recording a Financial Data: Memorandum Book, business transaction, Journal, Rules for Debit and Credit, Compound Journal entry, Advantages of Journal, Ledger, Ledger Account, Ledger Posting, Process of Posting, Balancing of An Account, Significance of Balances, Relation between Journal and Ledger- Subsidiary Books.						
III	Preparing Trial Balance Trail Balance: Objects, Methods of Preparing Trail Balance, how to locate errors, hints for the preparation of trail balance & problems.						
IV	Final Accounts Trading account - individual items posted to the debit of trading account - individual items credited to trading account – advantages of trading account – profit & loss account – advantages of profit & loss account – manufacturing account – balance sheet – classification of assets & liabilities						

V	<p>ACCOUNTS FOR NON PROFIT ORGANISATION</p> <p>Introduction – Final accounts of no trading concern – receipts and payments account – features – income & expenditure account - feature - distinction between the two – treatment of special items – some important adjustments – types of problems – Distinction between income and expenditure account and profit and loss account – accounts of professional men.</p>
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Extended Professional Component (is a part of internal component only, Not to be including the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Financial Accounting - T.S.Reddy, A.Murthy – Margham Publications, 2012. 2. Fundamentals of Advanced Accounting - R.S.N.Pillai, Bagavathi, S.Uma, 5th Edition, S.Chand Publication, 2012.
Reference books:	<ol style="list-style-type: none"> 1. Essentials of Financial Accounting – AsishK.Bhattacharayya, PHI, 2020. 2. Advanced Accountancy - S.P.Jain and Narang – Kalyani Publications, 2017.
Web Resources	https://learn.sparkfun.com/tutorials/digital-logic/all

Course outcomes: CO	On completion of this course, the students will Be able to:
C01	Obtaining basic knowledge of accounting
C02	To explain the concepts and procedures of financial reporting, including income and expenditure statement, balance sheet etc.
C03	To locate and analyze financial data from annual reports of corporations
C04	Acquire Knowledge on receipts and payments account
C05	Have the necessary understanding on Final accounts of no trading concern

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	3	3	3
C0 2	3	3	2	3	2	3	3	2
C0 3	3	2	3	3	3	1	2	3
C0 4	2	3	3	3	3	3	3	3
C0 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Cloud Computing

Title of the Course		Cloud Computing					
Course Type		Elective - IV					
Year	II	Semester	IV	Credits	3	Course Code	24UECA42
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	-		-		3
Learning Objectives							
L01	Learning fundamental concepts and Technologies of Cloud Computing.						
L02	Learning various cloud service types and their uses and pitfalls.						
L03	To learn about cloud Architecture and Application design.						
L04	To know the various aspects of application design, benchmarking and security on the Cloud.						
L05	To learn the various Case Studies in Cloud Computing.						

Unit	Contents
I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce– Identity and Access Management–Service Level Agreements– Billing.
II	Cloud Services Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services Content Delivery Services: Amazon Cloud Front - Windows Azure Content Delivery Network Deployment and Management Services: Amazon Elastic Bean stack- Amazon Cloud Formation Open-Source.
III	Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability –Security – Maintenance and Up gradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services.

IV	<p>Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.</p> <p>Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.</p>
V	<p>Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.</p>

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Arshdeep Bahga, Vijay Madiseti, Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018
Reference books:	<ol style="list-style-type: none"> 1. Anthony T Velte, To by J Velte, Robert Elsenpeter, and Cloud Computing: A Practical Approach, Tata Mc Graw-Hill, 2013. 2. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
Web Resources	<ol style="list-style-type: none"> 1. https://en.wikipedia.org/wiki/Cloud_computing 2. https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7

Course outcomes: CO	On completion of this course, the students will Be able to:
C01	Understand the fundamental concepts and Technologies in Cloud Computing.
C02	Able to understand various cloud service types and their uses and pitfalls.
C03	Able to understand Cloud Architecture and Application design.
C04	Understand the various aspects of application design, benchmarking and security in the Cloud.
C05	Understand various Case Studies in Cloud Computing.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	3	3	3	3	3	3	3	3
C0 2	3	3	2	3	2	3	3	2
C0 3	3	2	3	3	3	1	2	3
C0 4	2	3	3	3	3	3	3	3
C0 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Multimedia Systems Lab

Title of the Course	Multimedia Systems Lab						
Course Type	Skill Enhancement Course - V						
Year	II	Semester	IV	Credits	2	Course Code	24USCAL4
Instructional Hours Per week	Lecture	Tutorial		Lab Practice		Total	
	-	-		2		2	
Learning Objectives							
L01	Understand the definition of Multimedia						
L02	To study about the Image File Formats, Sounds & Audio File Formats						
L03	Understand the concepts of Animation						
L04	To study about the cropping techniques						
L05	Understand the concept of various colour effects						

Experiments

1. Create an animation to represent the growing moon.
2. Design and make a ball bouncing on steps.
3. Simulate the movement of a cloud showing the colour effects.
4. Prepare a cover page for the book of your subject area.
5. Design a visiting card containing at least one graphic and text information.
6. Make a poster for the forthcoming election and show the difference in resolution and quality.
7. Paint the scenery of a park.
8. Use effective cropping techniques to design a collage.
9. Display your name through the given background with at least five text effects and shadow emboss
10. Create a one minute theme video with suitable audio effects.

Recommended Texts	TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGrawHill,200
Reference Books:	Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.
Web resources:	https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/

Course outcomes	On completion of this course, students will be able to:
C01	Understand the concepts, importance, application and the process of developing multimedia
C02	To have basic knowledge and understanding about image related processing
C03	To understand the framework of frames and bit images to animations
C04	Learn about the cropping techniques
C05	Understanding the concept of poster making

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C01	3	3	3	3	3	3	3	3
C02	3	3	2	3	2	3	3	2
C03	3	2	3	3	3	1	2	3
C04	2	3	3	3	3	3	3	3
C05	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Advanced Excel

Title of the Course		Advanced Excel					
Course Type		AEC - II					
Year	II	Semester	IV	Credits	2	Course Code	24UACA41
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		2	-		-	2	
Learning Objectives							
L01		Handle large amounts of data					
L02		Aggregate numeric data and summarize into categories and sub-categories					
L03		Filtering, sorting and grouping data or subsets of data					
L04		Create pivot tables to consolidate data from multiple files					
L05		Presenting data in the form of charts and graphs					
Unit	Contents						
I	Basics of Excel-Customizing common options-Absolute and relative cells-Protecting and un-protecting worksheets and cells-Working with Functions-Writing conditional expressions-logical functions – lookup and reference functions-VlookUP with Exact Match, Approximate Match-Nested V look UP with Exact Match-VlookUP with Tables,Dynamic Ranges-Nested VlookUP with Exact Match-Using V Look UP to consolidate Data from Multiple Sheets						
II	Data Validations- Specifying a valid range of values –Specifying is of valid values Specifying custom validations based on formula Working with Templates Designing the structure of a template-templates for standardization of worksheets - Sorting and Filtering Data –Sorting tables-multiple-level sorting-custom sorting-Filtering data for selected view - advanced filter options-Working with Reports Creating subtotals-Multiple-level subtotal.						
III	Creating Pivot tables Formatting and customizing Pivot tables-advanced options of Pivot tables-Pivot Charts Consolidating data from multiple sheets and files usingP ivot tables-external datasources-data consolidation feature to consolidate data-Show Value As % of Row, % of Column, Running Total, Compare with Specific Field-Viewing Subtotal under Pivot-Creating Slicers.						
IV	More Functions Date and time functions-Text functions-Database functions-Power Functions – Formatting Using auto formatting option for worksheets-Using conditional formatting option for rows, columns and cells-What If Analysis- Goal Seek-Data Tables-Scenario Manager.						

V	Charts -Formatting Charts-3D Graphs-Bar and Line Chart together-Secondary Axis in Graphs-Sharing Charts with PowerPoint/ MS Word, Dynamically- New Features Of Excel Spark lines, Inline Charts, data Charts-Overview of all the new features.
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Excel 2019 All Microsoft Excel 2019 Pivot Table Data Crunching
Reference books	Excel 2019 All-in-One for Dummies, Greg Harvey, 1st edition
Web Resources	https://www.simplilearn.com https://www.w3schools.com https://www.w3schools.com

Course outcomes CO	On completion of this course, the students will be able to
CO1	Work with big data tools and its analysis techniques.
CO2	Analyze data by utilizing clustering and classification algorithms.
CO3	Learn and apply different mining Algorithms and recommendation systems for large volumes of data
CO4	Perform analytics on data streams
CO5	Learn No-SQL data bases and management.

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Semester - V

Operating Systems

Title of the Course		Operating Systems					
Course Type		CORE - V					
Year	III	Semester	V	Credits	4	Course Code	24UMCA51
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	2		--		5
Learning Objectives							
L01	To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.						
L02	Understand the basic working process of an operating system.						
L03	Understand the importance of process and scheduling.						
L04	Understand the issues in synchronization and memory management.						
L05	To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.						

UNIT	CONTENTS
I	Introduction: What Operating system do? – Computer System Operation – Storage Structure - Operating System Structure - Operating System Operation. System Structures: Operating System Services – System Calls – System Programs – Operation System Generation- System Boot.
II	Process Concept: Process Concept- Process Scheduling – Operation on Processes- Inter Process Communication. Process Scheduling: Basic concept-Scheduling criteria- Scheduling algorithm- Multiple Processor Scheduling - Real Time CPU Scheduling.
III	Synchronization: Background - The Critical section problem-Peterson's solution - Semaphores – Classic problems of Synchronization. Dead Locks: System model-Deadlock Characterization Methods for handling deadlocks- Deadlock Prevention-Deadlock Avoidance-Deadlock detection - Recovery from deadlock.
IV	Memory Management: Background–Swapping-Contiguous Memory allocation – Segmentation – paging. Virtual Memory Management: Background - Demand paging -Copy and Write-page replacement.

V	<p>File System: File Concept - Access Method - Directory and Disk Structure - File sharing-Protection.</p> <p>Mass Storage Structure: Overview of Mass Storage Structure- Disk Structure-Disk Scheduling - Disk Management</p>
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Texts:

1	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, 9th Edition, John Wiley & Sons (ASIA) Pte Ltd. ,2012
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References Books:

1	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

Web Resources:

1	https://en.wikipedia.org/wiki/Operating_system https://www.geeksforgeeks.org/what-is-an-operating-system/
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Course outcomes	On completion of this course, students will be able to:
C01	Describe the fundamental concepts and techniques of natural language processing.
C02	Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.
C03	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each
C04	Use NLP technologies to explore and gain a broad understanding of text data.
C05	Analyze large volume text data generated from arrange of real-World applications. Use NLP methods to perform topic modelling.

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2		3
C02	3	3	3	3	2	3		3
C03	3	2	3	1	3	3		2
C04	3	3	2	3	3	2		3
C05	1	2	3	3	2	3		2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

ASP .Net Programming

Title of the Course		ASP .Net Programming					
Course Type		CORE - VI					
Year	III	Semester	V	Credits	4	Course Code	24UMCA52
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		2	2		--	4	
Learning Objectives							
L01	To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.						
L02	To develop ASP.NET Web application using standard controls.						
L03	To implement file handling operations.						
L04	To handles SQL Server Database using ADO.NET.						
L05	To handles SQL Server Database using ADO.NET.						

UNIT	CONTENTS
I	Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – String operations.
II	Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.
III	Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.
IV	ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding.
V	Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security – Authentication - Authorization – Creating a Web application.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts:	
1	Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber Publication, 2019.
2	Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015
References Books:	
1	Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill, 2017.
2	Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres, 2013.
3	Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc.2016.
4	DenielleOtey, Michael Otey, ADO.NET: The Complete reference, Mc Graw Hill, 2008.
5	Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.
Web Resources:	
1	https://www.geeksforgeeks.org/introduction-to-net-framework/
2	https://www.javatpoint.com/net-framework

Course outcomes	On completion of this course, students will be able to:
C01	Develop working knowledge of C# programming.
C02	To develop a software to solve real-world problems using ASP.NET.
C03	To Work on Various Controls Files.
C04	To create a web application using Microsoft ADO.NET.
C05	To develop web applications using XML.

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2	3	3
C02	3	3	3	3	2	3	3	3
C03	3	2	3	2	3	3	3	2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

Data Analytics using R

Title of the Course		Data Analytics using R					
Course Type		Core - VII					
Year	III	Semester	V	Credits	4	Course Code	24UMCA53
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		4	1		--	5	
Learning Objectives							
L01	To understand the problem-solving approaches						
L02	To learn the basic of Big Data						
L03	To learn the basic programming constructs in R Programming						
L04	To use R Programming data structures.						
L05	To do input/output with files in R Programming.						

Unit	Contents
I	Big Data: Evolution of Big data, Best Practices for Big data Analytics, Big data characteristics, Validating, The Promotion of the Value of Big Data, Big Data Use Cases, Characteristics of Big Data Applications, A General Overview of High-Performance Architecture, HDFS, Map Reduce And YARN, Map Reduce Programming Model
II	Control Structures: Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes
III	Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations
IV	Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames.
V	Factors and Tables: Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Functions for Statistical Distributions R PROGRAMMING .

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC – CSIR/GATE /TNPSC/others to be solved (To be discussed during the Tutorial hour) Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency Professional Communication and Transferrable Skill
Text Book	<ol style="list-style-type: none"> 1. Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016. 2. Norman Matloff, The Art of R Programming-A Tour of Statistical Software Design, 2011
Reference Books	<ol style="list-style-type: none"> 1. Garrett Golemund, Hadley Wickham, Hands-On Programming with R: Write Your Own Functions and Simulations , 1st Edition, 2014 2. Roger D.Peng, R Programming for data science, 2012
Web Resources	https://www.simplilearn.com

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6		PO8
CO1	3	3	2	3	3	2		3
CO2	3	3	3	3	2	3		3
CO3	3	2	3	1	3	3		2
CO4	3	3	2	3	3	2		3
CO5	1	2	3	3	2	3		2

Strong (3) Medium (2) Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	
CO1	3	3	2	3	
CO2	3	2	3	1	
CO3	3	3	3	3	3
CO4	2	3	2	3	2
CO5	3	2	3	3	3

ASP.Net Programming Lab

Title of the Course	ASP.Net Programming Lab						
Course Type	CORE - LAB - 5						
Year	III	Semester	V	Credits	3	Course Code	24UMCAL5
Instructional Hours Per week	Lecture		Tutorial		Lab Practice		Total
	1		-		3		4
Learning Objectives							
L01	To develop ASP.NET Web application using standard controls.						
L02	To create rich database applications using ADO.NET.						
L03	To implement file handling operations						
L04	To implement XML classes.						
L05	To utilize ASP.NET security features for authenticating the website.						

EXPERIMENTS

1. Create an exposure of Web applications and tools.
2. Implement the Html Controls.
3. Implement the Server Controls.
4. Web application using Web controls.
5. Web application using List controls.
6. Web Page design using Rich control. Validate user input using Validation controls. Working with File concepts.
7. Web application using Data Controls.
8. Data binding with Web Controls.
9. Data binding with Data Controls.
10. Database application to perform insert, update and delete operations.
11. Ticket reservation using ASP.NET controls.
12. Online examination using ASP.NET controls

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019... 2. Mathew, Mac Donald, the Complete Reference ASP.NET, Tata McGraw-Hill, 2015.
Reference Books:	<ol style="list-style-type: none"> 1. Herbert Scheldt, The Complete Reference C#.NET, Tata Mc Graw-Hill, 2017. 2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech press, 2013. 3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach & Associates Inc.2016. 4. DenielleOtey, Michael Otey, ADO.NET: The Complete reference, Mc Graw Hill, 2008. 5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.
Web resources:	https://alison.com/course/introduction-to-c-plus-plus-programming

Course outcomes: CO	On completion of this course, the students will be able to
CO1	Create web applications and implement various controls
CO2	Create a web page in Rich control.
CO3	Develop knowledge about file handling operations.
CO4	An ability to design database application
CO5	To develop a software to solve real world problems using ASP.NET

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	2	3	3
C02	3	3	3	3	2	3	3	3
C03	3	2	3	1	3	3	3	2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	3	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	3	3	2	3	2
C05	1	2	3	3	3

Software Project Management

Title of the Course	Software Project Management						
Course Type	Elective - V						
Year	III	Semester	V	Credits	3	Course Code	24UECA51
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	3		1		-	4	
Learning Objectives							
L01	To define and highlight importance of software project management.						
L02	To formulate and define the software management metrics & strategy in managing projects						
L03	Understand to apply software testing techniques in commercial environment						
L04	To know about critical chain						
L05	Analyze the legal issues in software						

UNIT	CONTENTS
I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.
II	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project - Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.
III	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II
IV	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Levelling Resource Assignments - Critical Chain Scheduling.
V	Quality: Requirements - The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, “Quality Software Project Management”, Pearson Education Asia 2002.
Reference books	<ol style="list-style-type: none"> 1. Pankaj Jalote, “Software Project Management in Practice”, Addison Wesley 2002. 2. Hughes, “Software Project Management”, Tata McGraw Hill 2004, 3rd Edition.
Web Resources	NPTEL & MOOC courses titled Software Project Management www.smartworld.com/notes/software-project-management

Course outcomes: CO	On completion of this course, the students will Be able to:
C01	Understand the principles and concepts of project management
C02	Knowledge gained to train software project managers
C03	Apply software project management methodologies.
C04	Able to create comprehensive project plans.
C05	Evaluate and mitigate risks associated with software development process

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2	3	3
C02	3	3	3	3	2	3	3	3
C03	3	2	3	2	3	3	3	2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

MOOCs on SWAYAM

Title of the Course	MOOCs on SWAYAM						
Course Type	Elective - V						
Year	III	Semester	V	Credits	3	Course Code	24UECA52
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		3	1		-	4	

AI and its Applications

Title of the Course	AI and its Applications						
Course Type	Elective - VI						
Year	III	Semester	V	Credits	3	Course Code	24UECA53
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		3	1		-	4	
Learning Objectives							
L01	Understand AI Concepts and Industry-Specific Applications						
L02	Explore Data Processing and AI Model Deployment						
L03	Analyze AI-Powered Decision-Making and Automation						
L04	Examine AI Ethics, Regulations, and Challenges						
L05	Design and implement AI-driven applications tailored to real-world industry needs.						

UNIT	CONTENTS
I	Introduction to Artificial Intelligence: Artificial Intelligence, How Does AI Work?, Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI.
II	Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).
III	Introduction to Prompt Engineering, Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work?, Comprehending Prompt engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication. Prompts for Creative Thinking: Introduction, Unlocking Imagination and Innovation. Prompts for Effective Writing: Introduction, Igniting the Writing Process with Prompts.
IV	Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI, Expert System, Internet of Things, Artificial Intelligence of Things (AIoT).

v	Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research.
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Reema Thareja, Artificial Intelligence: Beyond Classical AI, Pearson Education, 2023. 2. Ajantha Devi Vairamani and Anand Nayyar, Prompt Engineering: Empowering Communication, 1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: https://doi.org/10.1201/9781032692319). 3. Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, “AI for Everyone – A Beginner’s Handbook for Artificial Intelligence”, Pearson, 2024
Reference books	<ol style="list-style-type: none"> 1. B. V. Ravindran – Introduction to Machine Learning and AI Applications, McGraw Hill India (2020) 2. Parag Kulkarni – Artificial Intelligence: Building Intelligent Systems, PHI Learning (2020) 3. Dr. N. Gupta – AI and Industry 4.0: Applications and Challenges, Wiley India (2020).
Web Resources	<ol style="list-style-type: none"> 1. https://ocw.mit.edu/ 2. https://www.coursera.org/learn/ai-for-everyone 3. https://cloud.google.com/solutions/ai 4. https://www.microsoft.com/en-us/ai/ai-business-school 5. https://aimi.stanford.edu/

Course Outcomes:

Course outcomes: CO	On completion of this course, the students will be able to:
C01	Explain AI techniques and their role in different industries.
C02	Apply AI models to industry-specific problems in healthcare, finance, and manufacturing.
C03	Analyze AI-powered decision-making systems and automation techniques in various sectors.
C04	Evaluate ethical, security, and regulatory challenges in AI applications across industries.
C05	Design and develop AI-driven solutions tailored for real-world industry needs.

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	3	2	2	1	3	2	2
C02	3	3	2	2	3	1	3	3	2
C03	3	3	3	3	2	2	3	3	3
C04	3	2	3	3	3	2	3	3	2
C05	2	3	2	3	2	1	3	3	3
Average	2.80	2.60	2.60	2.60	2.40	1.40	3.00	2.80	2.40

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Machine Learning

Title of the Course	Machine Learning						
Course Type	Elective - VI						
Year	III	Semester	V	Credits	3	Course Code	24UECA54
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		3	1		-	4	
Learning Objectives							
L01	To Learn about Machine Intelligence and Machine Learning applications						
L02	To implement and apply machine learning algorithms to real-world applications						
L03	To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems						
L04	To create instant based learning						
L05	To apply advanced learning						

UNIT	CONTENTS
I	Introduction- Machine Learning - Relationship Between AI, Machine Learning and Deep Learning - Machine learning vs big data - Scope of Machine Learning - Applications of Machine Learning - Key terminology - How to choose the right algorithm - Steps in developing a machine learning application -Types of Machine Learning - Parametric and non-parametric models.
II	Introduction - Linear Regression - Logistic Regression - Bayesian Learning - Naïve Bayes classifier - K-Nearest Neighbour (KNN) - Why do we need a K-NN Algorithm? - How does KNN work - Support Vector Machines (SVM) - Decision Tree - How does a Decision Tree work?
III	Introduction- K-means Clustering - Association Rule Mining - Apriori Algorithm- FP Growth - How does FP-Growth work - DBSCAN - How does DBSCAN work - DBSCAN Key Concepts and Parameters- Hierarchical Clustering - Why hierarchical clustering matters in machine learning - Hierarchical vs K-Means clustering.
IV	Concept Learning - Maximum Likelihood Estimation - Minimum Description Length Principle - EM Algorithm - Gibbs Algorithm - Mistake Bound Model. Instance based learning - Radial Basis Functions - Case-Based Learning Recommendation systems - Opinion mining - Sequential Covering Algorithm - First Order Rules - Explanation Base Learning - FOCL Algorithm - Reinforcement Learning - Q-Learning - Temporal Difference Learning.

v	Biological and Artificial Neural networks – Basic Building Blocks of Neural Networks– Perceptron’s – Multilayer Perceptron - Back Propagation Networks. Genetic Algorithms (GA) – Basic terminologies - General genetic algorithm – Operators in GA.
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Tom M. Mitchell, –Machine Learning, McGraw-Hill Education (India) Private Limited, 2013. 2. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning" 2015, MIT Press.
Reference books	<ol style="list-style-type: none"> 1. Ethem Alpaydin, –Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004. 2. Stephen Marsland, –Machine learning: An Algorithmic Perspective, CRC Press, 2009.
Web Resources	<ol style="list-style-type: none"> 1. https://www.learnovita.com/machine-learning-algorithms-for-data-science-tutorial 2. https://www.aionlinecourse.com/tutorial/machine-learning?utm_source=chatgpt.com 3. https://medium.com/data-science/comparative-study-on-classic-machine-learning-algorithms-24f9ff6ab222?utm_source=chatgpt.com https://scikit-learn.org/

Course Outcomes:

Course outcomes: CO	On completion of this course, the students will be able to:
C01	Understand machine learning concepts.
C02	Analyze supervised machine learning algorithm.
C03	Analyze unsupervised machine learning algorithm.
C04	Learn advanced topics on Machine Learning
C05	Understand the concept of Neural Network and Genetic Algorithm

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
C01	3	2	3	2	2	1	3	2	2
C02	3	3	2	2	3	1	3	3	2
C03	3	3	3	3	2	2	3	3	3
C04	3	2	3	3	3	2	3	3	2
C05	2	3	2	3	2	1	3	3	3
Average	2.80	2.60	2.60	2.60	2.40	1.40	3.00	2.80	2.40

Strong (3)

Medium (2)

Low (1)

CO/PSO			PSO3		
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

Enhancing the Programming Skills

Title of the Course	Enhancing the Programming Skills						
Course Type	Ability Enhancement Course – III						
Year	III	Semester	V	Credits	2	Course Code	24UACA51
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	2	-		-	2		
Learning Objectives							
L01	To understand the character set and different data types in C						
L02	To learn the different condition and branching						
L03	To learn arrays and Functions						
L04	To explore Pointers						
L05	To understand about structures and unions						

UNIT	CONTENTS
I	Overview of C: Overview of C - Structure of a C program – Data types – Declarations – operators – Expressions – Type conversions – Built-in functions.
II	Control and Branching : Data Input and Output – Control statements: IF, ELSE-IF, GOTO, SWITCH, WHILE-DO, DO-WHILE, FOR, BREAK and CONTINUE.
III	Arrays and Functions: Arrays: Defining and processing Arrays – Multidimensional arrays –String functions – String Manipulation. Functions: Defining and Accessing Arguments – recursive functions – call by value, call by reference, storage classes –character arrays and string functions.
IV	Pointers: Pointers –Defining and Declaration of Pointers – Operations on pointers – pointers to functions – Pointer and strings –array of pointers – pointer expressions.
V	Structures and Unions: Structure and Unions: Defining, giving values to members, initialization and comparison of structure variables, arrays of structures –structures and pointers – unions.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	“Programming in C” – E.Balagurusamy – Fifth Edition, Tata McGraw Hill Publications.
Reference books	<ol style="list-style-type: none"> 1. “Programming with C” – Byron S.Gottfried – Schaum’s outline series – Tata McGraw Hill Publications. 2. “Let Us C “– Kanetkar.Y, Eighteenth Edition, BPB Publications, 2021. 3. “A first course in Programming with C” – T.Jeyapoovan, Vikas Publishing Hous Pvt. Ltd., New Delhi.
Web Resources	https://www.codechef.com/learn/course/c

Course outcomes CO	On completion of this course, the students will be able to
C01	Understand the usage of data types, variables, operators and expressions
C02	Analyse the conditional and branching statements
C03	Create own arrays and user defined functions
C04	explore Pointers
C05	Work with Union, Structures

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06		P08
C01	3	3	2	3	3	2		3
C02	3	3	3	3	2	3		3
C03	3	2	3	2	3	3		2
C04	3	3	2	3	3	2		3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

Personality Development

Title of the Course		Personality Development			
Course Type		Indian Knowledge System (IKS)			
Course Code		24UPDT51			
Year	III	Semester	V	Credits	2
Instructional Hours Per week		Lecture	Tutorial	Lab Practices	Total
		1	1	--	2

UNIT - I

Personality - Definition – Determinants – Personality Traits –Theories of Personality – Importance of Personality Development. Self-Awareness – Meaning – Benefits of Self – Awareness – Developing Self – Awareness. Swot – Meaning – Importance- Application – Components. Goal Setting Meaning- Importance – Effective goal setting – Principles of goal setting – Goal setting at the Right level.

UNIT - II

Self-Monitoring – Meaning – High self – monitor versus low self-monitor – Advantages and Disadvantages self-monitor- Self –monitoring and job performance. Perception- Definition- Factor influencing perception- Perception process –Errors in perception – Avoiding perceptual errors. Attitude – Meaning- Formation of attitude – Types of attitude - Measurement of Attitudes – Barriers to attitude change – Methods to attitude change. Assertiveness - Meaning – Assertiveness in Communication – Assertiveness Techniques – Benefits of being Assertive – Improving Assertiveness.

UNIT - III

Team Building – Meaning – Types of teams – Importance of Team building- Creating Effective Team. Leadership – Definition – Leadership style- Theories of leadership – Qualities of an Effect leader. Negotiation Skills – Meaning – Principles of Negotiation – Types of Negotiation – The Negotiation Process – Common mistakes in Negotiation process. Conflict Management – Definition- Types of Conflict- Levels of Conflict – Conflict Resolution – Conflict management.

UNIT -IV

Communication – Definition – Importance of communication – Process of communication - Communication Symbols – Communication network – Barriers in communication – Overcoming Communication Barriers. Transactional Analysis – Meaning – Ego States – Types of Transactions – Johari Window- Life Positions. Emotional Intelligence- Meaning – Components of Emotional Intelligence- Significance of managing Emotional intelligence – How to develop Emotional Quotient. Stress Management – Meaning – Sources of Stress – Symptoms of Stress – Consequences of Stress – Managing Stress

UNIT - V

Social Graces – Meaning – Social Grace at Work – Acquiring Social Graces. Table Manners – Meaning – Table Etiquettes in Multicultural Environment- Do's and Don'ts of Table Etiquettes. Dress Code – Meaning- Dress Code for selected Occasions – Dress Code for an Interview. Group Discussion – Meaning – Personality traits required for Group Discussion- Process of Group Discussion- Group Discussion Topics. Interview – Definition- Types of skills – Employer Expectations –Planning for the Interview – Interview Questions- Critical Interview Questions.

References:

1. Dr.S. Narayana Rajan, Dr. B. Rajasekaran, G. Venkadasalaphi, V. Vijuresh Nayaham and Herald M.Dhas, **Personality Development**, Publication Division, Manonmaniam Sundaranar University, Tirunelveli
2. Stephan P.Robbins, **Organisational Behaviour**, Tenth Edition, Prentice Hall of India Private Limited, New Delhi,2008
3. Jit S. Chandan, **Oragnisational Behaviour**, Third Edition, Vikas Publishing House Private Limited, 2008
4. Dr.K.K. Ramachandran and Dr.K.K. Karthick, **From Campus to Corporate**, Macmillan Publishers India Limited, New Delhi, 2010.

Semester - VI RDBMS with PL/SQL

Title of the Course		RDBMS with PL/SQL					
Course Type		CORE - VIII					
Year	III	Semester	VI	Credits	5	Course Code	24UMCA61
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	2		--		5
Learning Objectives							
L01	Describe basic concepts of database system						
L02	Design a Data model and Schemas in RDBMS						
L03	Competent in use of SQL						
L04	Analyze functional dependencies for designing robust Database						
L05	Describe basic concepts of database system						

UNIT	CONTENTS
I	Introduction to DBMS: Data and Information - Database - Database Management System - Objectives - Advantages. ER Model: Building blocks of ER Diagram - Relationship Degree - Classification - ER diagram to Tables - ISA relationship - Constraints - Aggregation and Composition - Advantages
II	Relational Model: CODD's Rule- Relational Data Model -Key-Integrity- Relational Algebra Operations - Advantages and limitations - Relational Calculus - Domain Relational Calculus - QBE.
III	Structure of Relational Database: Introduction to Relational Database Design - Objectives - Tools - Redundancy and Data Anomaly - Functional Dependency - Normalization - 1NF - 2NF - 3NF - BCNF. Transaction Processing - Database Security.
IV	SQL: Commands - Data types - DDL - Selection, Projection, Join and Set Operations - Aggregate Functions - DML - Modification - Truncation - Constraints - Subquery.
V	PL/SQL: Structure - Elements - Operators Precedence - Control Structure - Iterative Control - Cursors - Procedure - Function - Packages - Exceptional Handling - Triggers.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts:	
1	S. Sumathi, S. Esakkirajan, “Fundamentals of Relational Database Management System”, Springer International Edition 2007.
References Books:	
1	Abraham Silberchatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, McGraw Hill 2019, 7 th Edition.
2	Alexis Leon & Mathews Leon, “Fundamentals of DBMS”, Vijay Nicole Publications 2014, 2 nd Edition.
Web Resources:	
1	NPTEL & MOOC courses titled Relational Database Management Systems
2	https://nptel.ac.in/courses/106106093/
3	https://nptel.ac.in/courses/106106095/

Course outcomes	On completion of this course, students will be able to:
C01	Understand the basic concepts of database system
C02	Design a Data model and Schemas in RDBMS
C03	Competent in use of SQL
C04	Analyze functional dependencies for designing robust Database
C05	Understand basic concepts of database system

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06		P08
C01	3	3	2	3	3	2		3
C02	3	3	3	3	2	3		3
C03	3	2	3	1	3	3		2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

Image Processing

Title of the Course		Image Processing					
Course Type		CORE - IX					
Year	III	Semester	VI	Credits	4	Course Code	24UMCA62
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		3	2		--		5
Learning Objectives							
L01	To learn fundamentals of digital image processing.						
L02	To learn about various 2D Image transformations						
L03	To learn about various image enhancement processing methods and filters						
L04	To learn about various classification of image segmentation techniques						
L05	To learn about various image compression techniques						

UNIT	CONTENTS
I	Introduction & Fundamentals: Definition of image and Digital image processing - Examples of Digital image processing- Fundamental steps in Digital image processing- Components of image processing system- Image acquisition- A simple image model- Zooming and shrinking of digital image.
II	Image enhancement in spatial domain: Introduction- Mathematical analysis of enhancement in spatial domain- Basic gray level transformation- Histogram processing- Histogram equalization - Histogram matching- Image enhancement using arithmetic and logical operation- Basic transformation- Basics of spatial filtering- Image enhancement infrequency domain: One dimensional fourier transform and its inverse- Two dimensional fourier transform and its inverse- Basics of filtering in frequency domain- Homomorphic filtering.
III	Color image processing: Introduction- Advantages of Color image processing- Categories of Color image processing- Color fundamentals- Primary colors - Secondary colors- Primary and secondary colors for pigments- Characteristics that are used for differentiating different colors- Color models- conversion between color models- Pseudo color image processing- Color transformation- Color image smoothing and sharpening- Color segmentation.

IV	Image Compression: Introduction-Mathematical analysis- Types of data redundancies- Image compression model - Compression strategies- Morphological Image processing: Introduction- Basic concept of set theory- Logic operations involving binary images- Dilation and erosion-opening and closing
V	Feature extraction and image segmentation: Introduction- Classification of features- Features of an image - Attributes of features- Complete process of feature extraction -Image segmentation - Thresholding- Region based segmentation.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts:	
Digital image processing – Abhishek and Poonam Yadav-university science press	
References Books:	
<ol style="list-style-type: none"> "The Handbook of Digital Imaging" by H. H. Arnold and J. W. Willson- Edition: 1st Edition "Fundamentals of Digital Image Processing" by Anil K. Jain Edition: 1st Edition 	
Web Resources:	
<ol style="list-style-type: none"> https://www.geeksforgeeks.org/digital-image-processing-basics https://www.javatpoint.com/digital-image processing-tutorial 	

Course outcomes	On completion of this course, students will be able to:
C01	Understand the fundamental concepts of digital image processing
C02	Understand various 2D Image transformations
C03	Understand image enhancement processing techniques and filters
C04	Understand the classification of Image segmentation techniques
C05	Understand various image compression techniques

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2	3	3
C02	2	3	3	3	2	3	3	3
C03	3	3	3	2	3	3	2	2
C04	3	3	2	3	3	3	3	3
C05	3	2	3	3	2	3	2	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	2	3	3	1	3
C03	3	3	3	3	3
C04	3	3	2	3	2
C05	3	2	3	3	3

RDBMS with PL/SQL Lab

Title of the Course	RDBMS with PL/SQL Lab						
Course Type	CORE - LAB - 6						
Year	III	Semester	VI	Credits	3	Course Code	24UMCAL6
Instructional Hours Per week	Lecture		Tutorial		Lab Practice		Total
	1		-		4		5
Learning Objectives							
L01	To enable the students to learn the designing of data base systems, foundation on the Relational model of data and normal forms.						
L02	To understand the concepts of data base management system, design simple Database models						
L03	To learn and understand to write queries using SQL, PL/SQL.						
L04	To enable the students to learn DML.						
L05	To understand the concepts of Cursor						

EXPERIMENTS

1. DDL Commands
2. DML Commands
3. TCL Commands
4. Fibonacci Series
5. Factorial
6. String Reverse
7. Sum Of Series
8. Trigger
9. Student Mark Analysis Using Cursor
10. Library Management System

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB /NET/UGC – CSIR/GATE/TNPSC/others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India,2016
Reference Books:	Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System concepts", McGraw Hill International Publication ,VI Edition Shio Kumar Singh , "Database Systems ",Pearson publications , II Edition
Web resources:	Web resources from NDL Library, E-content from open-source libraries

Course outcomes	On completion of this course, students will be able to:
C01	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
C02	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity Relationship Model.
C03	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query.
C04	Classify the different functions and various join operations and enhance the Knowledge of handling multiple tables.
C05	Learn to design data base operations and implement using PL/SQL programs.

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	3	3	3	2	3	3
C02	3	3	3	3	2	3	3	3
C03	3	2	3	1	3	3	3	2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	3	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	3	3	2	3	2
C05	1	2	3	3	3

Project with Viva Voce

Title of the Course	Project with Viva Voce						
Course Type	Project - 1						
Year	III	Semester	VI	Credits	3	Course Code	24UMCAP1
Instructional Hours Per week	Lecture		Tutorial		Lab Practice		Total
	-		-		5		5

Students will take a specific problem with a front-end and back-end (involving Database Connectivity) for the project and solve it and submit a report. Further each student will participate in regular project review with project guide/faculty.

Sample Projects

- E-commerce platform where a customer can register and buy a product
- Bus/Train Reservation system
- Store/Insurance Management system Courier service system
- Library Management system etc.,

Project with Viva voce- Individual or group of maximum three members-Project report should be submitted for external evaluation.

Internal 50 marks, External 50 marks.

Robotics and Its Applications

Title of the Course	Robotics and Its Applications						
Course Type	Elective - VII						
Year	III	Semester	VI	Credits	3	Course Code	24UECA61
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		2	2	-	4		
Learning Objectives							
L01	To understand the robotics fundamentals.						
L02	To understand the sensors and matrix methods						
L03	To understand the Programming language ROS						
L04	To study about the applications of robotics						
L05	To learn about the future trends of robotics						

UNIT	CONTENTS
I	Introduction to Robotics: Definition and history of robotics - Types of robots (industrial, mobile, service, etc.) - Key components of a robot: sensors, actuators, controllers - Overview of applications in various industries.
II	Robotic Hardware: Actuators: electric motors, servos, and pneumatic systems - Sensors: types and applications (proximity, vision, tactile, etc.) - Microcontrollers and processors in robotics - Design and construction of robotic systems.
III	Robot Programming: Programming languages for robotics: Python, C++, ROS (Robot Operating System) - Basics of ROS: nodes, topics, services - Writing and executing basic robot programs - Simulation tools: Gazebo, V-REP
IV	Applications of Robotics: Industrial automation and manufacturing - Robotics in healthcare: surgery, rehabilitation, assistive robots - Service robotics: domestic robots, logistics, customer service - Robotics in entertainment: animatronics, gaming, VR.
V	Ethics and Future Trends: Ethical considerations in robotics - Legal and societal implications - Future trends: AI in robotics, collaborative robots (cobots), swarm robotics - Case studies of emerging robotic technologies.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Introduction to Robotics: Mechanics and Control, John J. Craig 2. Robotics: Modelling, Planning and Control, Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, and Giuseppe Oriolo 3. Robot Programming: A Guide to Controlling Autonomous Robots, Cameron Hughes and Tracey Hughes
Reference books:	Learning ROS for Robotics Programming, Enrique Fernandez, Aaron Martinez, and Luis Sanchez
Web Resources	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.m https://www.geeksforgeeks.org/robotics-introduction/

Course outcomes: CO	On completion of this course, the students will be able to:
CO1	Understand the basics of Robotics.
CO2	Know about the robotics hardware.
CO3	Develop the basic robot programs.
CO4	Learn the areas where the robotics can be used.
CO5	Know the future trends of the robotics.

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2	3	3
C02	3	3	3	3	2	3	3	3
C03	3	2	3	1	3	3	2	2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

Computer Networks

Title of the Course	Computer Networks						
Course Type	Elective - VII						
Year	III	Semester	VI	Credits	3	Course Code	24UECA62
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	2		2		-	4	
Learning Objectives							
L01	To learn the basic concepts of Data communication and Computer network						
L02	To learn about wireless Transmission						
L03	To learn about networking and data link layer.						
L04	To study about Network communication.						
L05	To learn the concept of Transport layer						

UNIT	CONTENTS
I	Introduction: Data communications – networks - layers in OSI model – TCP/IP protocol suite – addressing – guided media – Unguided media.
II	Data Link Layer: Switching – Circuit switched networks – datagram networks – virtual circuit networks – Framing – Flow and Error control.
III	Network Layer: Network layer – IP V4 addressing – IPV6 addressing – ICMP – IGMP – unicast and multicast routing protocols.
IV	Transport layer: Process to process delivery – UDP -TCP - Congestion – congestion control – QoS.
V	Application Layer: Domain name system – name space – domain name space – distribution of name space – DN Sin the internet – remote logging email – file transfer - SNMP Protocol.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	1. Data communications and networking – Behrouz A Forouzan McGraw Hill 4thRep
Reference books:	1. Computer Networks – Tenenbaum -Pearson -2022 2. Computer networking –Kurose James F, Ross Keith W - Pearson – 2017 3. Data and computer communications – William Stallings – Pearson 2017 4. Computer networks and Internet – Douglas E Comer – Pearson – 2018
Web Resources	1. https://nptel.ac.in/courses/106105080 2. https://www.tutorialspoint.com/computer-networks/ind.ex.asp 3. https://www.javatpoint.com/computer-network-tutorial
Course outcomes: CO	On completion of this course, the students will Be able to:
CO1	Understand fundamental underlying principles of computer networking.
CO2	Understand details and functionality of layered network architecture.
CO3	Apply mathematical foundations to solve computational problems.
CO4	Analyze and evaluate performance of various communication protocols.
CO5	Compare and create new

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06		P08
C01	3	3	2	3	3	2		3
C02	3	3	3	3	2	3		3
C03	3	2	3	2	3	3		2
C04	3	3	2	3	3	2		3
C05	1	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	2	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

Introduction to Data Science

Title of the Course	Introduction to Data Science						
Course Type	Elective - VIII						
Year	III	Semester	VI	Credits	3	Course Code	24UECA63
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	2	2		-	4		
Pre-requisite							
Learning Objectives							
L01	To learn about the basics of Data Science and Big data.						
L02	To learn about overview and building process of Data Science.						
L03	To learn about various Algorithms in Data Science.						
L04	To learn about Hadoop Framework.						
L05	To learn about case study about Data Science.						

UNIT	CONTENTS
I	Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science
II	The Data science process: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building
III	Algorithms: Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised
IV	Introduction to Hadoop: Hadoop framework – Spark – replacing Map Reduce – No SQL – ACID – CAP – BASE – types
V	Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	<ol style="list-style-type: none"> 1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016 2. Roger Peng, “The Art of Data Science”, lulu.com 2016.
Reference books:	<ol style="list-style-type: none"> 1. Murtaza Haider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book. 2. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016. 3. Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2017, 1st Edition. 4. Cathy O'Neil, Rachel Schutt, “Doing Data Science Straight Talk from the Frontline”, O'Reilly Media 2013.\ 5. Lillian Pierson, “Data Science for Dummies”, 2017 II Edition
Web Resources	<ol style="list-style-type: none"> 1 https://www.w3schools.com/datascience/ds_introduction.asp 2 https://www.geeksforgeeks.org/introduction-to-data-science/ 3 https://www.javatpoint.com/data-science

Course outcomes: CO	On completion of this course, the students will Be able to:
CO1	Understand the basics in Data Science and Big data.
CO2	Understand overview and building process in Data Science.
CO3	Understand various Algorithms in Data Science.
CO4	Understand Hadoop Framework in Data Science
CO5	Case study in Data Science

Mapping With Programme Outcomes and Programme Specific Outcomes

COs	P01	P02	P03	P04	P05	P06	P07	P08
CO1	3	3	3	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	2
CO 3	3	2	3	3	3	1	2	3
CO 4	2	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	1

S-Strong (3) M-Medium (2) L-Low (1)

CO/PSO	PS01	PS02	PS03	PS04	PS05
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Data Mining and Warehousing

Title of the Course	Data Mining and Warehousing						
Course Type	Elective - VIII						
Year	III	Semester	VI	Credits	3	Course Code	24UECA64
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	2	2		-	4		
Learning Objectives							
L01	To provide the knowledge on Data Mining and Warehousing concepts and techniques.						
L02	To study the basic concepts of Data Mining, Architecture and Comparison.						
L03	To study a set of Mining Association Rules, Data Warehouses.						
L04	To study about Classification and Prediction, Classifier Accuracy.						
L05	To study the basic concepts of cluster analysis, Cluster Methods.						

UNIT	CONTENTS
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Pre-processing: Pre-processing the Data – Data cleaning –Data Integration and Transformation – Data Reduction.
II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.
III	Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.
IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.
V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	Han and M. Kamber, “Data Mining Concepts and Techniques”, 2001, Harcourt India Pvt. Ltd, New Delhi.
Reference books:	<ol style="list-style-type: none"> 1. K.P. Soman, Shyam Diwakar, V. Ajay “Insight into Data Mining Theory and Practice “,Prentice Hall of India Pvt. Ltd, New Delhi 2. Parteek Bhatia, ‘Data Mining and Data Warehousing: Principles and Practical Techniques’, Cambridge University Press, 2019
Web Resources	<ol style="list-style-type: none"> 1. https://www.topcoder.com/thrive/articles/data-warehousing-anddatamining#:~:text=Data%20warehousing%20is%20a%20method, compiled%20in%20the%20data%20warehouse. 2. https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining

Course outcomes: CO	On completion of this course, the students will Be able to:
C01	Understand the basic concepts and the functionality of the various data mining and data warehousing component
C02	Know the concepts of Data mining system architectures
C03	Analyze the principles of association rules
C04	Get analytical idea on Classification and prediction methods
C05	Gain knowledge on Cluster analysis and its methods.

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06		P08
C01	3	3	2	3	3	2		3
C02	3	3	3	3	2	3		3
C03	3	2	3	1	3	3		2
C04	3	3	2	3	3	2	1	3
C05	1	2	3	3	2	3		2

Strong (3)

Medium (2)

Low (1)

CO/P30	PS01	PS02	PS03	PS04	PS05
C01	3	3	2	3	3
C02	3	2	3	1	2
C03	3	3	3	3	3
C04	2	3	2	3	2
C05	3	2	3	3	3

MongoDB

Title of the Course		MongoDB					
Course Type		Ability Enhancement Course - IV					
Year	III	Semester	V1	Credits	2	Course Code	24UACA61
Instructional Hours per week		Lecture	Tutorial		Lab Practice		Total
		2	--		--		2
Learning Objectives							
L01	Understand the fundamental concepts of Mongo DB and its advantages over traditional relational databases.						
L02	Understand the structure and purpose of collections in Mongo DB.						
L03	Comprehend the concept and importance of indexing in Mongo DB						
L04	Understanding the Query Optimizer and Identifying and Implementing Various Index Types						
L05	Understand the concept of replication and its significance in ensuring data availability and redundancy.						

UNIT	CONTENTS
I	MongoDB Overview-Advantages-MongoDB Environment-Common Terms in MongoDB- Create and Drop Database.
II	Collections-Create and Drop Collections- MongoDB Data Types-Insert Command- MongoDB Query Document-Update Command-Delete Command-Projection-Limit Record-Sort Record-Aggregation.
III	Indexing- Compound Indexes -Indexing Objects and Arrays -Index Cardinality - Using explain () and hint ().
IV	The Query Optimizer-Types of Indexes-Unique Indexes -Sparse Indexes -Index Administration -Identifying Indexes-Changing Indexes.
V	Replication: Overview –Components of Replica sets Sharding: Overview – Understanding the Components of Cluster.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC /others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.
Recommended Texts:	
1	Kristina Chodorow "Mongo DB the definitive guide", Second Edition,, O'Reilly Media Inc.
References Books:	
1	Rick Copeland, 2013, "Mongo DB Applied Design Patterns", First Edition, O'Reilly Media Inc.
Web Resources:	
1	https://www.tutorialspoint.com/mongodb

Course outcomes	On completion of this course, students will be able to:
C01	Articulate the benefits of using MongoDB in various applications.
C02	Manage collections and documents efficiently and Implement CRUD operations to manipulate data.
C03	Optimize query performance using appropriate indexing strategies.
C04	Performance Optimization, Index Management Proficiency, and Analytical Skills in MongoDB.
C05	Implement replication to enhance data reliability and fault tolerance.

Mapping With Programme Outcomes and Programme Specific Outcomes

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08
C01	3	3	2	3	3	2	3	3
C02	2	3	3	3	2	3	3	3
C03	3	3	3	2	3	3	3	2
C04	3	3	2	3	3	3	1	3
C05	3	2	3	3	2	3	3	2

Strong (3)

Medium (2)

Low (1)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
C01	3	3	2	3	3
C02	2	3	3	1	3
C03	3	3	3	3	3
C04	3	3	2	3	2
C05	3	2	3	3	3

Blue Print - Semester Examinations Semester – I to VI

Class: U.G.

Time: 3 Hours

Max. Marks: 75

Section A

(10 x 1 = 10)

Answer all questions.

Choose the correct answer. (With four options)

	Unit I	Unit II	Unit III	Unit IV	Unit V
Question Nos.	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10

Section B

(5 x 5 = 25)

Answer all questions choosing either (a) or (b).

Answer should not exceed 250 words

	Unit I	Unit II	Unit III	Unit IV	Unit V
Question Nos.	11 (a) & 11 (b)	12 (a) & 12 (b)	13 (a) & 13 (b)	14 (a) & 14 (b)	15 (a) & 15 (b)

Section C

(5 x 8 = 40)

Answer all questions choosing either (a) or (b).

Answer should not exceed 500 words

	Unit I	Unit II	Unit III	Unit IV	Unit V
Question Nos.	16 (a) & 16 (b)	17 (a) & 17 (b)	18 (a) & 18 (b)	19 (a) & 19 (b)	20 (a) & 20 (b)