H.H. THE RAJAH'S COLLEGE

(AUTONOMOUIS)

PUDUKKOTAI – 622 001.

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS

BCA

2023 - 2024 ONWARDS

Introduction

BCA (Bachelor of Computer Application)

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state whichwillhelpthestudentstoensuresimilarqualityofeducationirrespectiveoftheinstituteandlocation.

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer Application is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Application can be seen on a higher level, as a science of problem solving and problem solving require precision, creativity, and careful reasoning. The ever-evolving discipline of computer Application also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer Application has a wide range of specialties. These include Computer Architecture,

Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty are a focuses on specific challenges. Computer Application is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Application is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics.

The Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various public and private enterprises.

1. Programme Outcomes(PO) of BCA

- Scientific aptitude will be developed in Students
- Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
- Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship.
- Students will possess basic subject knowledge required for higher studies, professional and applied courses.
- Students will be aware of and able to develop solution oriented approach towards

various Social and Environmental issues.

- Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
- The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modeling and solving real life problems.
- Utilize computer programming skills to solve theoretical and applied problems by critical understanding ,analysis and synthesis.
- To recognize patterns and to identify essential and relevant aspects of problems.
- Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
- Mould the students into responsible citizens in a rapidly changing interdependent society.

The above expectations generally can be pooled into 6 broad categories and can be modified according to institutional requirements:

PO1:Knowledge

PO2:ProblemAnalysis

PO3:Design/DevelopmentofSolutions

PO4:Conductinvestigationsofcomple

xproblemsPO5:Modern tool usage

PO6:Applyingtosociety

2. ProgrammeSpecificOutcomesof B.C.A., Degree Programme in Computer Applications

PSO1:Think in a critical and logical based manner

PSO2:Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.

PSO3:Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4:Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5:Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PO6:Provide students /learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PO7:Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.

PO8:Develop a range of generic skills helpful in employment, internships &societalactivities.

PO9:Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids: (put tick mark in each row)

PO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
PO1	✓					
PO2		✓				
PO3			✓			
PO4				✓		
PO5					✓	
PO6						✓

3. Highlights of the Revamped Curriculum

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real
- Life situations. The curriculum also facilitatespeer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Computer Science based problem solving skills are included as mandatory components in the‗ Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.

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State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest – Statistics with R Programming, Data Science, Machine learning. Internet of Things and Artificial Intelligence etc..

4. Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome/Benefits
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Mathematics and simulating mathematical Concepts to realworld.	• In stil confidence among students • Create interest for the subject
I,II,III,IV	**Skill Enhancement papers**(Discipline centric/Generic/Entrepreneurial)	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable
		• Training on Computing / Computational skills Enable the students gain knowledge and exposure on latest computational aspects
		• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		• Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self–employment • Create small scale entrepreneurs • Training to girls leads to women empowerment
		• Discipline centric skill will improve the Technical know how of solving real life problems using ICT tools

III,IV,V &VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	• Strengthening the domain knowledge • Introducing the stake holders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and interdisciplinary nature • Students are exposed to Latest topics on Computer Science / IT, that require strong mathematical background • Emerging topics in higher education /industry /communication network/ health sector etc. are introduced with hands-on-training, facilitates designing of mathematical models in the respective sectors
IV	Industrial Statistics	• Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II year Vacation activity	Internship /Industrial Training	• Practical training at the Industry/ Banking Sector /Private/ Public sector organizations / Educational institutions, enable the students gain professional Experience and also become responsible citizens.
V Semester	Project with Viva–voce	• Self-learning is enhanced • Application of the concept to real situation is conceived resulting intangible outcome
VI Semester	Introduction of Professional Competency component	• Curriculum design accommodates all category of learners; _Mathematics for Advanced Explain' component will comprise of advanced topics in Mathematics and allied fields, for those in the peer group / aspiring researchers; • _Training for Competitive Examinations' –caters to the needs of the aspirants towards most sought-after services of the nation viz, UPSC, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: **For Advanced Learners/ Honors degree**		• To cater to the needs of peer learners/ research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

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Annexure I

Suggested topics in Core component

1. Microprocessor and Microcontroller
2. Microprocessor and Microcontroller Lab
3. RDBMS with PL/SQL
4. PL/SQL Lab
5. Software Engineering
6. Machine Learning
7. Machine Learning Lab
8. Network Security
9. DataMining and Warehousing
10. Mobile Application Development
11. Mobile Application Development Lab
12. Introduction to Data Science and more..

Suggested topics in Elective Course

Generic Specific

1. Discrete Mathematics–I
2. Discrete Mathematics-II
3. Statistical Methods and its Application-I
4. Statistical Methods and its Application-II
5. Optimization Techniques
6. Nano Technology
7. Introduction to Linear Algebra
8. Graph Theory and its Application
9. Financial Accounting
10. Cost and Management Accounting
11. Digital Logic Fundamentals
12. Numerical Methods
13. Resource Management Techniques and more..

Elective course–(EC1-EC8)-Discipline Specific

1. Software Metrics
2. Natural Language Processing
3. Analytics for Service Industry
4. Cryptography
5. Database Management System
6. Big Data Analytics
7. IOT and its Applications
8. Software Project Management
9. Image Processing
10. Information Security
11. Human Computer Interaction
12. Fuzzy Logic
13. Artificial Intelligence
14. Mobile Adhoc Network
15. Computational Intelligence
16. Grid Computing
17. Cloud Computing
18. Artificial Neural Network
19. Agile Project Management and more..

[Pl.Note:InSemester-VI-ForEC7andEC8subjects
Instructionalhoursmaybeusedas:5per cycle]

Annexure II

Suggested topics in Skill Enhancement (SEC1-SEC8) Course

Skill Enhancement Course

1. Fundamentals of Information Technology
2. Introduction to HTML
3. Web Designing
4. PHP Programming
5. Software Testing
6. Problem Solving Techniques
7. Understanding Internet
8. Office Automation
9. Quantitative Aptitude
10. Open Source Technologies
11. Multimedia Systems
12. Advanced Excel
13. Biometrics
14. Cyber Forensics
15. Pattern Recognition
16. Enterprise Resource Planning
17. Robotics and Applications
18. Simulation and Modelling
19. Organization Behavior and more..

BCA SYLLABUS
2023-24
First Year

Semester-1

Part	Course Code	List of Courses	Hours	Credit
Part-I	23ULT1/23ULH1	Tamil Paper –I/ Hindi Paper I	**6**	**3**
Part-II	23ULE1	English Paper - I	**6**	**3**
Part-III	23UCA1	CC-1 Python Programming	**5**	**5**
	23UCA2P	CC-2 Python Programming Practical	**5**	**5**
	23UCAGE1	Generic Elective course -1 Digital Computer Fundamentals	**4**	**3**
Part-IV	23UCASEF1	Skill Enhancement Course - Foundation Course - Structured programming in C	**2**	**2**
	23USE1	Skill Enhancement Course-SEC1-Soft Skill and Industry awareness – Paper-I.	**2**	**2**
			30	**23**

Semester-II

Part	Course Code	List of Courses	Hours	Credit
Part-I	23ULT2/23ULH2	Tamil Paper –II/ Hindi Paper II	**6**	**3**
Part-II	23ULE2	English Paper - II	**6**	**3**
Part-III	23UCA3	CC-3 Object oriented programming concept using C++	**5**	**5**
	23UCA4P	CC-4 C++ Programming Practical	**5**	**5**
	23UCAGE2	Generic Elective course -2 Operations Research	**4**	**3**
Part-IV	23USE2	Skill Enhancement Course SEC2- Soft Skill and Industry awareness – Paper-II.	**2**	**2**
	23UCANMC1	Skill Enhancement Course SEC-3 –NMC-I	**2**	**2**
			30	**23**

Second Year

Semester-III

Part	Course Code	List of Courses	Hours	Credit
Part-I	23ULT3/23ULH3	Tamil Paper –III/ Hindi Paper III	**6**	**3**
Part-II	23ULE3	English Paper - III	**6**	**3**
Part-III	23UCA5	CC5-Data Structures and Algorithms	**5**	**5**
	23UCA6P	CC6-Practical:Data Structures and Algorithms Practical	**5**	**5**
	23UCAGE3	Elective Course3(Generic/Discipline Specific)-EC3- **(Allied - II) Paper-I Financial Accounting**	**3**	**-**
	23UCAGE4P	Elective Course 4(Generic/Discipline Specific) **(Allied -II)Paper -II - Accounting Packages Practical**	**3**	**-**
Part-IV	23USE3	Skill Enhancement Course-SEC-4 (Entrepreneurial Based)– **common paper**	**1**	**1**
	23UCANMC2	Skill Enhancement Course-SEC-5(Discipline Specific/Generic)**NMC-II**	**-**	**2**
		Environmental Studies	**1**	**-**
			30	**19**

Semester-IV

Part	Course Code	List of Courses	Hours	Credit
Part-I	23ULT4/23ULH4	Tamil Paper –IV/ Hindi Paper IV	**6**	**3**
Part-II	23ULE4	English Paper - IV	**6**	**3**
Part-III	23UCA7	CC7-Programming in Java	**5**	**5**
	23UCA8P	CC8 -Programming in Java Practical	**5**	**5**
	23UCAGE3	ElectiveCourse-EC3(Generic/Discipline Specific)– **(Allied -2)Paper -I Financial Accounting**	**2**	**3**
	23UCAGE4P	Elective Course 4(Generic/Discipline Specific) **(Allied -2)Paper -II Accounting Packages Practical**	**3**	**3**
Part-IV	23UCANMC3	Skill Enhancement Course–SEC-6- **NMC-III**	**-**	**2**
	23UVEGS	**Value Education and Gender Studies**	**2**	**2**
	23UES	**Environmental Studies**	**1**	**2**
			30	**28**

Third Year

Semester-V

Part	Course Code	List of Courses	Hours	Credit
Part-III	23UCA9	CC9–Operating Systems	**5**	**4**
	23UCA10	CC10-Programming in PHP	**5**	**4**
	23UCA11P	CC11-Programming in PHP – Practical	**5**	**4**
	23UCAE1A	Elective Course–EC5(Discipline Specific)– **Software Engineering**	**4**	**3**
	23UCAE1B	Elective Course–EC5(Discipline Specific)– **IOT and its Applications**		
	23UCAE2A	Elective Course–EC6(Discipline Specific)– **(Online Objective)**	**4**	**3**
	23UCA12PW	CC12-ProjectwithViva voce(Individual)	**5**	**4**
Part-IV	23UCANMC4	Skill Enhancement Course SEC-7(NMC-IV)	**2**	**2**
	23UIT	Internship/Industrial Training (Summer vacation at the end of IV semester activity)	**-**	**2**
			30	**26**

Semester-VI

Part	Course Code	List of Courses	Hours	Credit
Part-III	23UCA13	CC13-DataMining	**6**	**4**
	23UCA14	CC14– VB.NET Programming	**6**	**4**
	23UCA15P	CC15- VB.NET Programming Practical	**6**	**4**
	23UCAE3A	Elective Course–EC7(Discipline Specific)– **Data Communication and Networks**	**5**	**3**
	23UCAE3B	Elective Course–EC7(Discipline Specific)– **Software Project Management**		
	23UCAE4A	Elective Course – EC8 (Discipline Specific) **E-Commerce and its Applications**	**5**	**3**
	23UCAE4B	Elective Course – EC8 (Discipline Specific) **Human Computer Interaction**		
Part-IV	23UCANMC5	Professional Competency Skills (NMC V)	**2**	**2**
	23UEA	Extension Activity	**-**	**1**
			30	**21**

Total Credits: 140

FIRST YEAR

SEMESTER-I

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA1	**PYTHON PROGRAMMING**	**Core**	Y	-	-	-	5	5	25	75	100

Course Objective	
LO1	To make students understand the concepts of Python programming.
LO2	To apply the OOPs concept in PYTHON programming.
LO3	To impart knowledge on demand and supply concepts
LO4	To make the students learn best practices in PYTHON programming
LO5	To know the costs and profit maximization

UNIT	**Details**	**No. of Hours**
I	**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.	15
II	**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.**	15
III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	15
IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	15
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6

Textbooks	
1	ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2	Dr. R. Nageswara Rao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.
Reference Books	
1.	VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.
2.	Mark Lutz, "Learning Python", Orielly.
3.	Adam Stewarts, "Python Programming", Online.
4.	Fabio Nelli, "Python Data Analytics", APress.
5.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.
Web Resources	
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**3**	**2**	**2**	**3**	**3**	**3**
CO 2	**3**	**2**	**2**	**3**	**2**	**3**
CO 3	**3**	**2**	**2**	**3**	**2**	**2**
CO 4	**3**	**2**	**2**	**3**	**2**	**3**
CO 5	**3**	**2**	**2**	**3**	**3**	**3**
Weightage of course contributed to each PSO	15	10	10	15	13	14

-Strong-3 M-Medium-2 L-Low-1

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA2P	**PYTHON PROGRAMMING PRACTICAL**	**Core**	-	-	Y	-	5	5	40	60	100

Course Objective	
LO1	Be able to design and program Python applications.
LO2	Be able to create loops and decision statements in Python.
LO3	Be able to work with functions and pass arguments in Python.
LO4	Be able to build and package Python modules for reusability.
LO5	Be able to read and write files in Python.
Sl.No	**Details**
1.	Program using variables, constants, I/O statements in Python.
2.	Program using Operators in Python.
3.	Program using Conditional Statements.
4.	Program using Loops.
5.	Program using Jump Statements.
6.	Program using Functions.
7.	Program using Recursion.
8.	Program using Arrays.
9.	Program using Strings.
10.	Program using Modules.
11.	Program using Lists.
12.	Program using Tuples.
13.	Program using Dictionaries.
14.	Program for File Handling.

Course Outcomes	
On completion of this course, students will	
CO1	Demonstrate the understanding of syntax and semantics of
CO2	Identify the problem and solve using PYTHON programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO5	Develop a PYTHON program for a given problem and test for its correctness.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**2**	**2**	**2**	**2**	**3**	**2**
CO 2	**2**	**1**	**3**	**2**	**-**	**2**
CO 3	**3**	**3**	**1**	**1**	**1**	**2**
CO 4	**2**	**3**	**3**	**1**	**-**	**1**
CO 5	**3**	**2**	**3**	**1**	**1**	**-**
Weightage of course contributed to each PSO	12	11	12	7	5	7

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

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCAGE1	DIGITAL COMPUTER FUNDAMENTALS	Elective	Y	-	-	-	3	4	25	75	100

CourseObjective		
LO1	Identify the logic gates and their functionality.	
LO2	Perform number conversions from one system to another system	
LO3	Understand the functions of combinational circuits	
LO4	Perform number conversions.	
LO5	Perform Counter design and learn its operations.	
UNIT	**Details**	**No.of Hours**
I	Number Systems: Decimal - Binary - Octal – Hexadecimal - Conversion From One Another - Binary Addition - Subtraction - Multiplication And Division – Codes - BCD Weighted-Excess – Gray - Error Detection Codes.	15
II	Basic Logic Gates – Boolean Algebra: Laws and Theorems – The Universal Building Blocks - Sum of Products - Product of Sums – Karnaugh Map Simplification .	15
III	Combinational Logic Circuits: Adder – Half and Full Adder - Subtractor - Multiplexers – Demultiplexers – Decoders – Encoders .	15
IV	Flip – Flops : RS - Clocked RS – D Flip – Flop – JK Flip – Flop – T Flip – Flop – Edge Triggered - - Master/Slave Flip – Flop	15
V	Counters and Registers: Counters - Ripple Counter – Ring Counter - Registers – Shift Registers	15
	Total	**75**

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) Skills acquired from the course	
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	
Text Book	
1	"Principles Digital Electronics" – K. Meena, PHI. UNIT I: Chapter 1 UNIT II: Chapter 2(2.1 - 2.7, 2.9), 3(3.1, 3.3, 3.5 – 3.9, 3.13, 3.14) UNIT III: Chapter 4(4.1 – 4.5, 4.7 – 4.10) UNIT IV: Chapter 5(5.1 – 5.8) UNIT V: Chapter 6(6.1 – 6.3, 6.8)
Reference Book	
1	"Digital Computers Fundamentals", Bartee, Tata McGraw Hill, 1996.
Web Resources	
1	http://www.darshan.ac.in/upload/diet/documents/ec/de_21310004_all_28122015_080325am.pdf

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCASEF1	STRUCTURED PROGRAMMING IN C	FC	Y	-	-	-	2	2	25	75	100

CourseObjective		
LO1	To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.	
LO2	To understand the concept using if statements and loops	
LO3	This unit covers the concept of Arrays	
LO4	This unit covers the concept of Functions	
LO5	To understand the concept of implementing pointers.	
UNIT	**Details**	**No.of Hours**
I	**Overview of C**: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.	6
II	**Decision Making and Branching**: Decision making with If, simple IF, IF ELSE, nested IF ELSE , ELSE IF ladder, switch, GOTO statement.**Decision Making and Looping**: While, Do-While, For, Jumps in loops.	6
III	**Arrays**: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.	6
IV	**Functions**: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions	6
V	**Pointers:** definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	6
	Total	**30**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6,PO7
3	Apply the programming principles learnt in real-time problems	PO3,PO4,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.	
Reference Books		
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.	
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998	
3.	YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021	
Web Resources		
1.	https://codeforwin.org/	
2.	https://www.geeksforgeeks.org/c-programming-language/	
3.	http://en.cppreference.com/w/c	
4.	http://learn-c.org/	
5.	https://www.cprogramming.com/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**1**	**2**	**2**	**2**	**2**	**-**
CO 2	**2**	**2**	**2**	**2**	**-**	**2**
CO 3	**3**	**2**	**2**	**1**	**1**	**-**
CO 4	**3**	**2**	**2**	**1**	**-**	**1**
CO 5	**1**	**2**	**2**	**2**	**2**	**3**
Weightage of course contributed to each PSO	7	10	10	18	15	6

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

SEMESTER-II

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA3	OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++	Core	Y	-	-	-	5	5	25	75	100

CourseObjective		
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects	
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc	
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism	
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming	
LO5	Demonstrate the use of various OOPs concepts with the help of programs	
UNIT	**Details**	**No.of Hours**
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, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions – Function Overloading.	15
II	**Classes and Objects:** Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	15
III	**Operator Overloading:** Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	15
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.	15
V	**Files** – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .	15
	Total	**75**

Course Outcomes		Programme Outcome
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4 ,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.	
Reference 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.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**3**	**2**	**1**	**-**	**-**	**1**
CO 2	**2**	**2**	**2**	**1**	**-**	**-**
CO 3	**3**	**1**	**1**	**-**	**1**	**-**
CO 4	**1**	**2**	**1**	**2**	**2**	**1**
CO 5	**3**	**2**	**1**	**2**	**3**	**2**
Weightage of course contributed to each PSO	12	9	6	5	6	4

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

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA4P	**C++ PROGRAMMING PRACTICAL**	**Core**	-	-	Y	-	5	5	40	60	100

Course Objective	
LO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
LO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc
LO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
LO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
LO5	Demonstrate the use of various OOPs concepts with the help of programs
Sl.No	**Details**
1.	Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2.	Write a C++ program to demonstrate Class and Objects
3.	Write a C++ program to demonstrate the concept of Passing Objects to Functions
4.	Write a C++ program to demonstrate the Friend Functions.
5.	Write a C++ program to demonstrate the concept of Passing Objects to Functions
6.	Write a C++ program to demonstrate Constructor and Destructor
7.	Write a C++ program to demonstrate Unary Operator Overloading
8	Write a C++ program to demonstrate Binary Operator Overloading
9.	Write a C++ program to demonstrate: • Single Inheritance • Multilevel Inheritance • Multiple Inheritance • Hierarchical Inheritance • Hybrid Inheritance
10.	Write a C++ program to demonstrate Virtual Functions.
11.	Write a C++ program to manipulate a Text File.
12.	Write a C++ program to perform Sequential I/O Operations on a file.
13.	Write a C++ program to find the Biggest Number using Command Line Arguments
14.	Write a C++ program to demonstrate Class Template
15.	Write a C++ program to demonstrate Function Template.
16.	Write a C++ program to demonstrate Exception Handling.

Course Outcomes		Programme Outcome
CO	Upon completion of the course the students would be able to:	
1	Remember the program structure of C with its syntax and semantics	PO1,PO6
2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
3	Apply the programming principles learnt in real-time problems	PO4 ,PO7
4	Analyze the various methods of solving a problem and choose the best method	PO6
5	Code, debug and test the programs with appropriate test cases	PO7,PO8
Text Book		
1	E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.	
Reference 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.	
Web Resources		
1.	https://alison.com/course/introduction-to-c-plus-plus-programming	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**3**	**3**	**3**	**3**	**1**	**2**
CO 2	**2**	**3**	**3**	**3**	**1**	**2**
CO 3	**2**	**3**	**3**	**3**	**1**	**2**
CO 4	**2**	**3**	**3**	**3**	**1**	**2**
CO 5	**2**	**3**	**3**	**3**	**1**	**2**
Weightage of course contributed to each PSO	11	15	15	15	5	10

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

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCAGE2	OPERATIONS RESEARCH	Elective	Y	-	-	-	3	4	25	75	100

Learning Objective		
To Understand the Fundamentals of Operation Research		
To Understand the Various Problems in OR.		
To Visualize the Network Scheduling and PERT.		
Course Outcome		
Would have learnt the various concepts of OR.		
Would have learnt the various types of OR.		
UNIT	**Details**	**No.of Hours**
I	**Introduction To O.R.** – Elementary Treatment Of L.P.P- Methodology Of Or – Mathematical Formation Of The Problem – Graphical And Solution Method – Un Balanced Graphical And Solution - Slack And Surplus Variables-Matrix Formulation Of L.P.P-Simplex Algorithm – Simplex Method	15
II	**Application Of Transportation Problem**- North West Corner – Least Cost Method – Vogel's Approximation Method - Transportation Algorithm - Moving Towards Optimality	15
III	**Assignment Problem**- Impossible Assignment Problem – Unbalanced Assignment Problem - The Assignment Algorithm.	15
IV	**Network Scheduling**: CPM – Introduction – Network and Basic Components – Rules for Network Construction – Time Calculation in Network - Critical Path Method	15
V	**PERT:** Introduction - PERT - PERT Calculation – Float and Negative Slack – Advantages of Network: PERT and CPM	15
	Total	**75**
	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)	

SEMESTER-III

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCA5	DATASTRUCTURESAND ALGORITHMS	Core	Y	-	-	-	5	5	25	75	100

CourseObjective		
LO1	To understand the concepts of ADTs.	
LO2	To learn linear datastructures-lists,stacks,queues.	
LO3	To learn Tree structures and application of trees.	
LO4	To learn graph structures and and application of graphs.	
LO5	To understand various sorting and searching.	
UNIT	**Details**	**No.of Hours**
I	**Basic Terminology** – Data Structure Operations.Algorithms: Complexity, Time Space Tradeoff. Arrays: Linear Array – Representation of Linear Array –Operations of Array : Insertion - Deletion. Bubble Sort – Linear Search- Binary Search	15
II	**Linked List**- Representation of Linked List in Memory– **Traversing – searching – Insertion – Deletion.**	15
III	**Stack:** Array Representation of Stacks – Linked Representation of Stacks - Arithmetic Expression : Polish notation : Prefix, Infix, Postfix**– Quick Sort –** Queue - Linked Representation of Queue	15
IV	**Trees:** Binary Tree - Representing Binary tree in Memory : Linked Representation of Binary tree- Sequential Representation of Binary tree– Traversing Binary Tree – Traversal Algorithms Using Stack - Binary Search Trees - Insertion – Deletion in Binary Search Trees – Heap Sort	15
V	**Graph:** Terminology – Sequential Representation of Graph : Adjacency Matrix - Path Matrix. Linked Representation of Graph - Operations on Graphs – Sorting: Insertion Sort – Selection Sort – Merge Sort	15
	Total	**75**

Course Outcomes:

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

CO-1: Would have learnt the various Data Structure
CO-2: Learn linked list and its operations.
CO-3: Gain knowledge about stack and queue.

CO-4: Understand about tree concept and its operations. CO-5: Understanding the concept of graph representation and its operations	
Text Book	
1	Data Structures – Lipschuta, Tata Mcgraw Hill, Schaum's Outline Series. UNIT I: Chapter 1.2, 1.4, 1.5, 4.2 – 4.8 UNIT II: Chapter 5.2 – 5.5, 5.7, 5.8, 5.10 UNIT III: Chapter 6.2 – 6.6, 6.10, 6.11 UNIT IV: Chapter 7.2 – 7.5, 7.7 – 7.9, 7.17 UNIT V: Chapter 8.2 – 8.3, 8.5, 8.6, 9.3-9.5
Reference Book	
1	Fundamentals of Data Structure – Ellis Horowitz And SartajSahini

Mapping Course Outcomes with Programme Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	9	1	3	9	1
CO2	3	9	3	1	1
CO3	9	9	3	9	9
CO4	1	3	9	9	9
CO5	3	9	9	3	3
Weightage	25	31	27	31	23
Weightage Percentage of Course Contribution of PO's	4.92	6.22	6.72	7.05	5.11

S-Strong-9 M-Medium-3 L-Low-1

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCA6P	DATASTRUCTURESANDALGORITHMS PRACTICAL USING C++	Core	-	-	Y	-	5	5	40	60	100

Course Objective	
LO1	To understand the concepts of ADTs
LO2	To learn linear data structures -lists,stacks,queues
LO3	To learn Tree structures and application of trees
LO4	To learn graph strutures and application of graphs
LO5	To understand various sorting and searching
Sl.No	**Details**
1.	Write a C++ program to implement the List ADT
2.	Write a C++ program to implement the following using a singly linkedlist
3.	Write a C++ program that reads an infix expressionconverts the expression to postfix form
4.	Write a C++ program to implement priority queueADT.
5.	Write a C++ program to perform the following operations: • Insert an entitlement binary search tree. • Delete an element from a binary searchtree.
6.	Write a C++ program to perform the following operations • Insertion into an AVL-tree • Deletion from an AVL-tree
7.	Write a C++ programs for the implementation of BF\S and DFS for a given graph.
8	Write a C++ programs for implementing the following searching methods: • Linear search • Binary search.
9.	Writeaprogramfor implementing thefollowingsortingmethods: • Bubble sort • Selection sort

Course Outcomes		ProgrammeOutcome
CO	On completion of this course, students will	
1	Understand the concept of Dynamic memory management,data types, algorithms, Big O notation	PO1,PO4,PO5
2	Understand basic data structures such as arrays, linked lists,stacks and queues	PO1,PO4,PO8
3	Describe the hash function and concepts of collision and Its resolution methods	PO1,PO3,PO6
4	Solve problem involving graphs, trees and heaps	PO3,PO4
5	Apply Algorithm for solving problems like sorting,searching,insertion and deletionof data	PO1,PO5,PO6
TextBook		
1	Mark AllenWeiss,–Data Structures and Algorithm Analysis in C++‖,Pearson Education2014,4th Edition.	
2	ReemaThareja,–Data Structures Using C‖,OxfordUniversitiesPress2014,2nd Edition	
ReferenceBooks		
1	Thomas H.Cormen, ChalesE.Leiserson, Ronald L.Rivest, Clifford Stein,–Introduction to Algorithms‖,McGrawHill2009,3rdEdition	
2.	Aho, HopcroftandUllman,–DataStructuresandAlgorithms‖,PearsonEducation2003	
WebResources		
1.	NPTEL&MOOC coursestitledDataStructures	
2.	https://nptel.ac.in/courses/106106127/	

Mapping Course Outcomes with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**1**	**-**
CO2	**1**	**2**	**1**	**-**	**-**	**2**
CO3	**3**	**1**	**2**	**1**	**-**	**-**
CO4	**2**	**2**	**1**	**2**	**3**	**1**
CO5	**3**	**2**	**1**	**-**	**-**	**-**
Weightage of course contributed to each PSO	12	10	8	5	4	4

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

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCAGE3	FINANCIAL ACCOUNTING	Allied - II	Y	-	-	-	3	5	25	75	100

CourseObjective		
LO1	To Understand the Types of Accounting.	
LO2	To Visualize the Ledgers, Balance Sheets and Errors	
UNIT	**Details**	**No.of Hours**
I	**Fundamentals of Book-Keeping**: Accounting, Objectives, Classifications, Concepts and Conventions. Double Entry Systems and Single Entry Systems: Advantages, Difference between Single and Double Entry System, Rules of Double Entry System, Types of Accounts: Personal Account, Real Account, Nominal Account. Journal: Narration, Advantages, Limitations, Exercises.	15
II	**Ledgers**: Meaning, Methods, Advantages, Differentiate between Journal and Ledger, Exercises. Subsidiary Books: Objectives, Types, Advantages, Exercises. Trial Balance: Definition, Objects/Advantages, Specimen Format, Preparation of Trial Methods: Balance / Total methods. Solved Problems.	15
III	**Rectification of Errors**: Definition, Types, Suspense Account, Exercises. Trading Accounting: Specimen form, Direct and Indirect Expenses, Important of Gross and Net Profits. Profit and Loss Account: Specimen, Difference between Trading and Profit & Loss Account. Exercises.	15
IV	**Balance Sheet**: Terms of Assets and Liabilities, Classification, Limitations, Procedure, Exercises. Final Account: With Adjustments and Without Adjustment, Exercises.	15
V	**Depreciation:**Definition, Objects, Factors. Methods of Depreciations: Straight line Method, Return down Value Method, Annuity Method, Sinking Fund Method.	15
	Total	**75**

Course Outcomes	
CO	On completion of this course, students will
1	Would have learnt the Basics of Accounting.
2	Would have learnt various methods of Financial Accountings.
3	Students will be know the knowledge of accounting and how to apply same in real time business world.
4	Students will be able to understand the accounting principle and standard and its application.
5	Students are able to prepare Financial Statements and interpret the results there off.
TextBook	
1	Financial Account – T.S. Reddy and A. Murthy – MarghamPubications. Advanced Accounting- Volume I [Financial Accounting] – Dr. S. Peer Mohamed, Dr. S.A.N. Shazuli Ibrahim – Pass Publications. UNIT I : 1.01 - 2.27 UNIT II : 2.01 - 3.12 UNIT III : 4.01 - 6.32 UNIT IV : 7.01- 7.58 UNIT V : 10.01 - 10.47
ReferenceBooks	
1	Advance accounting – M.C.Shukla, T.S. Grewal &S.C.Gupta – S.Chand And Co.,
2.	A.Murthy -Financial Accounting – Margham Publishers.

Mapping Course Outcomes with Programme Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	1	3	9
CO2	3	9	3	9	1
CO3	9	3	9	1	9
CO4	9	3	3	9	9
CO5	9	9	3	1	3
Weightage	31	27	19	23	31
Weightage Percentage of Course Contribution of PO's	6.10	5.42	4.73	5.23	6.89

S-Strong-9 M-Medium-3 L-Low-1

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCAGE4P	ACCOUNTING PACKAGES PRACTICAL	Allied Practical	-	-	Y	-	3	6	40	60	100

Course Objective	
LO1	Would have learnt the Basics of Accounting.
LO2	Would have learnt various methods of Financial Accountings.
LO3	Students will be know the knowledge of accounting and how to apply same in real time business world.
LO4	Students will be able to understand the accounting principle and standard and its application.
LO5	Students are able to prepare Financial Statements and interpret the results there off.
Sl.No	**Details**
1.	Company Creations
2.	Vouchers - Journals (Day Book)
3.	Ledger Creation – Editing and Deleting.
4.	Trial Balance - List of Ledgers Creation
5.	Trading Account -Gross Profit or Gross Loss
6.	Profit And Loss Account – Net Profit or Net Loss
7.	Balance Sheet for Final Account, Identify the Items of Liabilities and Assets
8	Final Account with Adjustment
9.	Final with Adjustment Calculation – Depreciation

Course Outcomes	
CO	On completion of this course, students will
1	Would have learnt the Basics of Accounting.
2	Would have learnt various methods of Financial Accountings.
3	Student will know the principles to implement the financial accounts.
4	Student will be able to understand the various methods.
5	Students are able to prepare Financial Statements and interpret the results there off.

SEMESTER-IV

Title of the Course/Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCA7	Programming in JAVA	Core	Y	-	-	-	5	5	25	75	100

CourseObjective		
LO1	To provide fundamental knowledge of object-oriented programming	
LO2	To equip the student with programming knowledge in Java from the basics up.	
LO3	To enable the students to use classes, objects and methods.	
LO4	To provide fundamental knowledge of inheritance, interface and packages.	
LO5	To enable the students to use AWT controls for GUI.	
UNIT	**Details**	**No.of Hours**
I	**Fundamentals of Object-Oriented Programming:** Introduction – Object Oriented Paradigm – Basic Concepts of OOP – Benefits of OOP – Applications of OOP. Java Evolution Java History – Java Features – Comments – Java Program Structure – Tokens – Java Statements – JVM – Command Line Arguments. Constants – Variables – Data Types – Type Casting.	15
II	**Operators and Expressions:** Arithmetic Operators – Arithmetic expressions, Evaluation of expression – Type Conversions – Operator Precedence – Mathematical Functions. Decision Making and Branching If – if…..else – Nesting of if……. Else – else if – switch - ?: operator. Decision Making and Looping, While – do while – for loops – jump in loops – labelled loops.	15
III	**Classes, Objects and Methods:** Defining a class – Adding variables, methods – Creating objects – Accessing Class Members. **Constructors** – Methods overloading – static members – Nesting of Methods. – **Inheritance** – Overriding methods – Abstract methods and classes – visibility control. **Arrays and Strings:** Arrays – One Dimensional Arrays – Creating an array – Two Dimensional Arrays – Strings.	15
IV	**Interfaces and Packages:** Multiple Inheritance - Defining interfaces – Extending interfaces – implementing interfaces – Accessing interface variables. Packages: Java API Packages – Using system packages – Naming conventions – Creating Packages – Accessing a Package – Using a Package – Adding a Class to a Package.	15
V	**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 - Colour - Fonts and layout managers.	15
	Total	**75**

Course Outcomes		
CO	On completion of this course, students will;	
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Java.	PO1, PO2, PO6
CO2	Implement the basic controls of Java.	PO2, PO3, PO8
CO3	Implement arrays, strings and inheritance of Java	PO1, PO3, PO5
CO4	Implement packages and interfaces.	PO2, PO6
CO5	Use AWT to create GUI.	PO1, PO3, PO6
Text Books:		
1.	**"Programming with JAVA"**, Second Edition 2006", E. Balagurusamy, TATA McGraw-Hill Publishing Company Limited, New Delhi.	
References :		
1.	"Java 2 – The Complete Reference", Fifth Edition, 2006 Herbert Schildt, TATA Mc Graw Hill Publishing Company Limited, New Delhi.	
2.	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010	
Web Resources		
1.	https://javabeginnerstutorial.com/core-java-tutorial	
2.	http://docs.oracle.com/javase/tutorial/	
3.	https://www.coursera.org/	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	**3**	**3**	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**2**	**2**	**1**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**1**
Weightage of course contributed to each PSO	**14**	**14**	**13**	**14**	**14**	**11**

S - Strong -3

M- Medium-2

L- Low-1

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst.Hours	Marks		
									CIA	External	Total
23UCA8P	**PROGRAMMING IN JAVA PRACTICAL**	**Core**	-	-	Y	-	5	5	40	60	100

Course Objective	
LO1	UnderstandthebasicconceptsofJavaProgrammingwithemphasisonethicsandprinciplesof professional coding
LO2	Demonstratethe branching andlooping,creationofobjects,classesandmethods.
LO3	Demonstratethecreationofobjects,classesandmethodsandthe concepts of constructor, methods overloading, Arrays, Strings
LO4	DevelopapplicationsusingInterfacesandPackages
LO5	Design a page using AWT controls and Mouse Events in JavaprogrammingImplementtheconceptsofcodereusabilityanddebugging.
Sl.No	**Details**
1.	Classes and Objects
2.	Control Statements
3.	Constructors
4.	Method Overloading and Overriding
5.	String Handling
6.	Inheritance
7.	Packages
8	Interfaces
9.	AWT controls
10.	AWT Event Handling

Course Outcomes	**Programme Outcome**

CO	On completion of this course, students will	
1	Understand the basic Object-oriented concepts. Implement the basic constructs of Java.	PO1
2	Implement classes and objects	PO1, PO2
3	Implement Method Overloading, Overriding and inheritance of Java	PO4, PO6
4	Implement packages and interfaces	PO4, PO5, PO6
5	Implement AWT and Event handling.	PO3, PO6
Text Book		
1	**"Programming with JAVA"**, Second Edition 2006", E. Balagurusamy, TATA McGraw-Hill Publishing Company Limited, New Delhi.	
Reference Books		
1.	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.	
2.	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.	
Web Resources		
1.	https://www.w3schools.com/java/	
2.	http://java.sun.com	
3.	http://www.afu.com/javafaq.html	

Mapping with Programme Outcomes:

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	**3**	**3**	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**2**	**2**	**1**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Weightage of course contributed to each PSO	**14**	**14**	**13**	**14**	**14**	**12**

S-Strong-3

M-Medium-2

L-Low-1

SEMESTER-V

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCA9	OPERATING SYSTEMS	Core	Y	-	-	-	4	5	25	75	100

Course Objective		
LO1	Understanding the design of the Operating System	
LO2	Imparting knowledge on CPU scheduling, Process and Memory Management.	
LO3	To code specialized programs for managing overall resources and operations of the computer.	
LO4	To study about the concept of Job and processor scheduling	
LO5	To learn about the concept of memory organization and multiprogramming	
UNIT	**Details**	**No. of Hours**
I	**Introduction**: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. **Process concepts:** definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.	15
II	**Asynchronous concurrent processes:** mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm,software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. **Concurrent programming:** monitors, message passing	15
III	**Deadlock and indefinite postponement:** Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.	15
IV	**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling.	15
V	**Real Memory organization and Management::** Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping **Virtual Memory organization:** virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. **Virtual Memory Management:** Demand Paging, Page replacement strategies	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2	know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock. .	PO4, PO6
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	Understand memory organization and management	PO3, PO8

Textbooks	
1	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011
Reference Books	
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, John Wiley &Sons(ASIA) Pte Ltd.,2012
3.	Understanding Operating System 6th Edition by Ann McHoes Ida M. Flynn, Cengage Learning India
Web Resources	
1.	https://www.tutorialspoint.com/operating_system/os_overview.htm
2.	https://www.javatpoint.com/os-tutorial
3.	https://www.guru99.com/operating-system-tutorial.html

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**1**					
CO 2	**2**	**1**				
CO 3				**1**		
CO 4				**1**	**1**	**3**
CO 5			**1**			**2**
Weightage of course contributed to each PSO	3	1	1	2	1	5

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCA10	PROGRAMMING IN PHP	Core	Y	-	-	-	4	5	25	75	100

Course Objective		
LO1	Would have learnt the basics of PHP	
LO2	Would have learnt the Programming using PHP.	
LO3	To illustrate the form validation techniques. and	
LO4	Create a program using classes and files handling concept	
LO5	Apply the concept to capture, retrieve and display information via database.	
UNIT	**Details**	**No. of Hours**
I	**Essential PHP**: Basic Concepts of OOP – Benefits of OOP Development Environment – Creating and Running PHP Page – Mixing HTML and PHP – Printing – Echo Power – Command Line PHP – Variables – Strings – Constants – Internal Data Types. **Operator and Flow Control:** Operator - If Statements – Switch Statement – Looping Statement: While, do....While, for each loops.	15
II	**Strings and Arrays:** String Functions – Arrays – Array with Functions and Loops - Multidimensional Arrays. **Creating Functions:** Function – Passing Variables – Returning Data - Returning Array – Returning List- Returning Reference – Variable Scope: local, static, global- Global Keyword - Conditional, Variable and Nesting. PHP Functions	15
III	**Form Handling – Form Validation -$-GET variable - $-POST variable - $-REQUEST Variable – Creating the Form. Reading data with PHP** : Setting up web Page – Handling text fields – Tool Box Controls - Password Controls - Hidden Controls - File Uploads- Handling Buttons.	15
IV	**File Handling:** Opening File – Looping over a file – Reading text and Character – Reading a whole file – Reading a file into array - Getting file information – Copying, Deleting, Reading and Writing files - Appending and locking files	15
V	**Working with Database:** Database – Essential SQL- Creating MYSQL Database – Creating a new table – Putting data – Accessing data – Updating – Inserting – Deleting Records – Creating new Database – Sorting Data.	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Define the fundamentals of PHP and identify the concepts	PO1
CO2	know the analysis of **Strings and Arrays**	PO1, PO2
CO3	Have a complete study about File Handling.	PO4, PO6
CO4	Have complete knowledge of File Handling and Form Validation.	PO4, PO5, PO6
CO5	Understand Database	PO3, PO8
Textbooks		
1	"THE COMPLETE REFERENCE: PHP", Steven Holzner, McGraw Hill Education (India) Edition 2008 Unit I: Chapter 1, 2 Unit II: Chapter 3, 4 Unit III: Chapter 5 Unit IV: Chapter 9 Unit V: Chapter 10	
Reference Books		
1.	"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and Working Together", Eric Rosebrock, Eric Filson, Published by John Wiley and Sons, 2004.	
Web Resources		
1.	https://www.tutorialspoint.com/	
2.	https://www.javatpoint.com/	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	2	2	1	3
CO 2	3	1	2	3	2	3
CO 3	3	3	1	2	3	2
CO 4	3	3	1	2	2	3
CO 5	1	3	3	2	1	2
Weightage of course contributed to each PSO	13	13	9	11	9	13

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCA11P	PROGRAMMING IN PHP– PRACTICAL	Core		-	Y	-	4	5	40	60	100

Course Objective	
LO1	Be able to design and program PHP applications.
LO2	Be able to create loops and decision statements in PHP.
LO3	Be able to work with functions and pass arguments in PHP.
LO4	Be able to build and package PHP modules for reusability.
LO5	Be able to read and write files in PHP.

Sl.No	Details
1.	Sum of Digits
2.	Check whether the given number is Armstrong / prime / perfect or not.
3.	Biggest Number using Function
4.	Display Book Details using For Each Loop
5.	Write a shell program to compare two given strings.
6.	Controls and Functions
7.	Passing Variables using HTML
8.	String Functions and Arrays
9.	Applications Form using MySql Table
10.	Create a MySQL table and execute queries to read, add, remove and modify a record from that table
11.	File System Functions
12.	Date and Time Functions
13.	File Upload and Converting Image File Types
14.	Write a shell program to change the extension of a given file.
15.	Write a server side PHP program that displays marks, total, grade of student in tabular format by accepting user inputs for name, number and marks from a HTML form.

Course Outcomes	
On completion of this course, students will	
CO1	Explore basic structure of web application and how the web browser interacts with the web server
CO2	Implement session managing data and cookies in PHP
CO3	Develop web application to connect My SQL using Portable Data Object(PDO)and issue SQL commands in PHP
CO4	Apply the open COURSE technologies to develop impressive and dynamic website
CO5	Explore basic structure of web application and how the web browser interacts with the web server

Mapping with Programme Outcomes:

CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**2**	**2**	**2**	**2**	**3**	**2**
CO 2	**2**	**1**	**3**	**2**	**-**	**2**
CO 3	**3**	**3**	**1**	**1**	**1**	**2**
CO 4	**2**	**3**	**3**	**1**	**-**	**1**
CO 5	**3**	**2**	**3**	**1**	**1**	**-**
Weightage of course contributed to each PSO	12	11	12	7	5	7

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE1A	SOFTWARE ENGINEERING	ELECTIVE	Y	-	-	-	3	4	25	75	100

Course Objective		
LO1	Understand the various phases of software development and software Engineering tools	
LO2	Know various Validation and Verification Techniques	
LO3	To illustrate the software requirements.	
LO4	Understand Software Design.	
LO5	Apply the concept to Software Cost Estimation.	
UNIT	**Details**	**No. of Hours**
I	**Introduction –** Definitions – Size Factors – Quality and Productivity Factors – Managerial Issues - Planning A Software Project – Introduction – Defining The Problem – Developing A Solution Strategy – Planning The Development Process – Planning An Organizational Structure – Other Planning Activities.	15
II	**Software Cost Estimation:**Software Cost Factors – Software Cost Estimation Techniques – Specification Techniques Staffing – Level Estimation: Estimating Maintenance Costs.	15
III	**Software Requirements:**Definition – Software Requirement Specification – Formal Specification Techniques – Languages and Processors for Requirements	15
IV	**Software Design** – Fundamental Design Concepts – Modules And Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time And Distributed System Design – Test Plans – Milestones, Walkthroughs And Inspections – Design Guidelines.	15
V	**Verification and Validation Techniques** – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Would have learnt the various phases of Software Engineering.	PO1
CO2	Select the process model for different applications	PO1, PO2
CO3	Understand the software requirements and describe various models. and architectural styles	PO4, PO6
CO4	Outline the approaches involved in software testing	PO4, PO5, PO6
CO5	Apply the software engineering process in creating real time applications	PO3, PO8
Textbooks		
1	Software Engineering Concepts – Richard Fairley. UNIT I: Chapter 1, 2 UNIT II: Chapter 3 UNIT III: Chapter 4 UNIT IV: Chapter 5 UNIT V: Chapter 7	
Reference Books		
1.	"Software Engineering: A Practitioners Approach" by Roger, S. Pressman McGraw Hill International Book Company.	
Web Resources		
1.	https://www.tutorialspoint.com	
2.	https://www.javatpoint.com	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	1	1	3	3
CO 2	2	3	3	2	1	2
CO 3	2	3	1	3	2	2
CO 4	3	2	3	1	2	3
CO 5	2	3	3	1	2	2
Weightage of course contributed to each PSO	12	13	11	8	10	12

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE1A	IOT and its applications	ELECTIVE	4	-	-	-	3	4	25	75	100

Learning Objective		
LO1	Use of Devices, Gateways and Data Management in IoT.	
LO2	Design IoT applications in different domain and be able to analyze their performance	
LO3	Implement basic IoT applications on embedded platform	
LO4	To gain knowledge on Industry Internet of Things	
LO5	To Learn about the privacy and Security issues in IoT	
UNIT	**Details**	**No. of Hours**
I	**IOT and Web Technology:** The Internet of Things Today : Definition and Brief History of IoT-Characteristics of IoT-Components and working principles of IoT-Advantages and Disadvantages of IoT –The IoT vision – IoT Applications: IoT Applications used in various fields- Future Internet Technologies-IoT and its Technologies-Cloud Computing Technologies-Infrastructure-Networks and Communications: IoT Communication Protocols – IoT Communication Protocol Layers.	15
II	**M2M to IoT:** M2M to IoT A Basic Perspective: M2M Concepts- Key Application Areas of M2M-Benefits and Drawbacks of M2M- M2M and IoT-M2M and IoT key Differences-IoT value chain-An Emerging industrial structure for IoT-Industrial IoT Trends and applications-Challenges in Industrial IoT solutions-Use cases for Industrial to IoT-M2M to IoT- An Architectural overview: Building Architecture - An IoT Architecture Outline.	15
III	**IoT Architecture:** State of the Art-IoT Architecture: IoT Architecture Building Blocks-Stages of IoT Architecture-IoT Architecture-Functional Layers-IoT Architecture standards-IoT Architectural Reference Model: Domain Model (DM)-Information Model (IM)-Functional Model-Communication Model – IoT Security Model – Benefits of Architectural Reference Models (ARM).	15
IV	**IoT Applications for Value Creations:** IoT Applications-Introduction: Value Creation using IoT Applications- Features of Value Creation using IoT-Challenges Faced by IoT Industry Applications- IoT Applications for Industry : Future Factory : IoT in the Enterprise- IoT in Present Industries Value Creations- IoT in the Future Industries Trends- Smart Objects and Smart Applications : Smartphone and Tablets –Smart TVs - IoT for Retailing Industry: How Can we Apply IoT to Retail-An Example Use Case of the Power of IoT in Retail Establishments-Home Management-How it Works-Key Benefits of Smart Home Management.	15
V	**IoT Privacy, Security and Governance:** IoT Privacy, Security and Governance-an Introduction- Overview of Governance, Privacy and Security Issues: IoT Devices Privacy- IoT Security- IoT Governance-Security, Privacy, and Trust in IoT- Data-Platforms for Smart Cities: Concerns of Privacy and Security in Smart Cities -Security Requirements of Smart Cities – Security Issues and Challenges of Smart Cities – First Steps Towards a Secure Platform : Five IoT Security Steps.	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Learn NoSQL databases and management.	PO3, PO5
Text Book		
1	Dr. Mahalingam Palaniandi, "IOT AND ITS APPLICATIONS", VR1 Publication, 2024	
Reference Books		
1.	Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World", kindle version.	
2.	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", A press Publications 2013, 1st Edition,.	
3	Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice" 4..CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media 2011	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.javatpoint.com	
3.	https://www.w3schools.com	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	**3**	**2**	**2**	**3**	**3**	**3**
CO2	**3**	**2**	**2**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**2**
Weightage of course contributed to each PSO	**15**	**12**	**11**	**15**	**15**	**14**

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

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCAE2A	**Computer Hardware**	**ELECTIVE**	Y	-	-	-	4	3	25	75	100

Course Objective		
LO1	To gain knowledge Computers able to analyze their performance	
LO2	Use of Mouse, KeyBoard, Printers.	
LO3	To Learn about the Computer Networks.	
LO4	To gain knowledge on System Diagnostic Tools	
LO5	To Learn about the Number Systems	
UNIT	**Details**	**No. of Hours**
I	**Introduction to Computers**– Types of Computers - Micro, Mini, Mainframe and Super Computer, Architecture of a Computer System–Processor (CPU) - Types and their specifications (Intel: Celeron, P4 family, Xeon, dual core, quad core, core 2 duo, i3,i5,i7 and AMD), ALU, Memory - Types, Storage, Semiconductor memories: RAM, ROM, PROM, EMPROM, EEPROM, Static and Dynamic, Cache Memory, Secondary Storage Devices -Types, Capacity, Popular Brands, Standards, Interface, Concept of Tracks, Sector, Cylinder and Cluster. Jumper setting, CMOS setting, Input/Output Devices	6
II	**Mouse, KeyBoard, Printers** - Study of Basic Principle, Construction and Operation of wired and wireless Optical Mouse, wired and wireless Keyboard, Study of Printers types, principle, Construction, Operation and Application of Impact Printers–DotMatrix and Line Printers, Non Impact Printers - Inkjet, Laser and Multi-Function Printers.	6
III	**Introduction to Computer Networks** – Definition, Advantages, Architecture: Peer-to-Peer and Client/Server Network. Network Topologies – Star, Ring, Bus, Tree, Mesh, Hybrid.Types of Network – Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN), Intranet and Internet.Wi-Fi, Bluetooth. **Network Components** – Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches– their functions, advantages and applications.	6
IV	**System Diagnostic Tools** - Diagnostic Tools Definition, Application of Windows OS Diagnostic Tools for Task Scheduler, Event Viewer, Shared Folder, Disk Management Services, Memory Diagnostic, Windows Defender, Windows OS Diagnostic Command for Resource, Performance and Memory – perfmon, mdsched, Linux OS Diagnostic Command – htop, vmstat, iotop , lscpu, hwinfo, lspci, lsscsi, lsusb, lsblk, fdisk and free.	6
V	**Number Systems:** Decimal - Binary - Octal – Hexadecimal - Conversion From One Another - Binary Addition - Subtraction - Multiplication And Division – Codes - BCD Weighted-Excess – Gray - Error Detection Codes.	6
	Total	**30**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Would have learnt the basics Computer Hardware, Including input, processing, output, and storage devices	PO1
2	Would have learnt the various Hardware Components Like wired and wireless keyboard and Printers	PO1, PO2
3	Would have Learnt the Network Topologies and their Components	PO4, PO6
4	Learn about System Diagnostic Tools	PO4, PO5, PO6
5	Learn about Number Systems	PO3, PO8
Text Book		
1	Shelly, Cashman, Vermaat "Introduction to Computers"	
Reference Books		
1.	Dr. M.R. Khan, Nitesh Kumar Sharma, Preesat Biswas "Fundamental of Computers with Hardware and Software"	
2.	PCHardware:TheCompleteReferencebyCraigZacker andJohn Rourke	
3.	PCHardware:ABeginner'sGuidebyRonGilster	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.javatpoint.com	
3.	https://www.w3schools.com	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**3**	**2**	**-**	**2**	**2**	**2**
CO 2	**2**	**2**	**2**	**2**	**-**	**3**
CO 3	**1**	**3**	**-**	**2**	**3**	**2**
CO 4	**1**	**3**	**1**	**2**	**2**	**2**
CO 5	**1**	**2**	**3**	**3**	**2**	**2**
Weightage	8	12	6	13	9	11
Weightage of course contributed to each PSO	1.6	2.4	1.2	2.6	1.8	2.2

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

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCAE2B	MANAGEMENT INFORMATION SYSTEMS	ELECTIVE	Y	-	-	-	4	3	25	75	100

Course Objective		
LO1	learn the fundamentals of MIS.	
LO2	visualize the various Management Techniques.	
LO3	To Learn about the Data Resource Management.	
LO4	To Understand the Telecommunication Networks.	
LO5	To gain knowledge on Data Resource Management.	
UNIT	**Details**	**No. of Hours**
I	**Foundations of Information Systems in Business:** Foundation Concepts – Components of Information Systems	6
II	**Competing with Information Technology:** Fundamentals of Strategic Advantage – Using Information Technology for Strategic Advantage	6
III	**Data Resource Management:** Technical Foundations of Database Management – Managing Data Resources.	6
IV	**Telecommunications and Networks:** The Networked Enterprise – Telecommunications Network Alternatives	6
V	**Decision Support Systems:** Decision Support in Business – Artificial Intelligence Technology in Business – Developing Business / IT Solutions	6
	Total	**30**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Would have learnt the basics of Management Information System	PO1
2	Would have learnt the fundamentals of Strategic Advantage	PO1, PO2
3	Learn about Managing Data Resources	PO4, PO6
4	Learn about Telecommunications Network Alternatives	PO4, PO5, PO6
5	Learn about Artificial Intelligence Technology in Business	PO3, PO8
Text Book		
1	James A. O'brien, Fourth Edition, "Management Information Systems",	
Reference Books		
1.	Gordon B. Davis Margrethe H. Olson , "Management Information Systems"	
Web Resources		
1.	https://www.tutorialspoint.com/management_information_system/index.htm	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**2**	**2**	**2**	**2**	**3**	**2**
CO 2	**2**	**1**	**3**	**2**	**-**	**2**
CO 3	**3**	**3**	**1**	**1**	**1**	**2**
CO 4	**2**	**3**	**3**	**1**	**-**	**1**
CO 5	**3**	**2**	**3**	**1**	**1**	**-**
Weightage of course contributed to each PSO	12	11	12	7	5	7

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

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UIT	INTERNSHIP / INDUSTRIALTRAINING	ELECTIVE	-	-	-	-	2	-	25	75	100

LearningObjectives	
LO1	Advancefromanintellectuallycuriousstudenttoacreator/makerandanindustryprofessional
LO2	Applyverbalandwrittencommunicationskillstoexplaintechnicalproblemsolvingtechniques andsolutionstoanincreasinglydiverseandglobalaudience
LO3	Collaboratewithinandacrossdisciplinaryboundariestosolveproblems
LO4	Applymathematicaland/orstatisticalmethodstofacilitateproblemsolving.
LO5	Exercisecomputationalthinkingovertheentiresoftwarelifecycle

Internship / Industrial Training:

Thestudentstoundergo2weeksofInternship/IndustrialTrainingintheIndustry

Sl.No	Area of Work	Maximum Marks
1	a)WorkRelatedperformance–WorkAttitude/Academic preparation/ problem solving ability/ Adaptability / Overall Attendance / Progress towards learning goals	10
	b)Organizationalskills– Timemanagementskills/Planningskills/communicationskills	20
	c)Relationship with others – Willingness to cooperate with co-works/ Ability to work with supervisor / Acceptanceofconstructivecomments/Abilitytotakedirection	20
2	InternshipReport/VivaVoceExamination	25
	Total	75

*CIAMarks=25marks(InternshipReview1,Review2andReview3)

CourseOutcomes		ProgrammeOutcomes
CO	Onsuccessfulcompletionofthiscourse,studentswillbeableto	
1	Findtheirspecificareasofinterest,refinetheirskillsand abilities	PO1,PO2,PO3,PO4,PO5, PO6
2	Showagreatersenseofself-awarenessandappreciationfor others	PO1,PO2,PO3,PO4,PO5, PO6
3	Applyproblemsolvingandcriticalthinkingskillstosolvereal time problem	PO1,PO2,PO3,PO4,PO5, PO6
4	DesignvarioussolutionapproachesforaddressingITbusiness needs.	PO1,PO2,PO3,PO4,PO5, PO6
5	ApplybestpracticesofITindustriesbyworkingintheProductor service domain.	PO1,PO2,PO3,PO4,PO5, PO6

MappingwithProgrammeOutcomes:

MAPPINGTABLE						
CO/ PSO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**
CO1	**3**	**1**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**3**	**1**
CO3	**3**	**2**	**2**	**3**	**3**	**2**
CO4	**3**	**3**	**1**	**3**	**3**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**3**
Weightageofcourse contributed toeachPSO	**14**	**12**	**9**	**14**	**14**	**10**

Strong-3 M-Medium-2 L-Low-1

Guidelinesforinternship

- Internshipshouldbeof2to3weeksduration.
- Astudentisexpectedtofindinternshipbyhimselforherself.However,theinstitution should assist their students in getting internship in good organizations.
- **Thehomeinstitutioncannotbetakenastheplaceofinternship.**
- Internship can be on any topic covered in the syllabus mentioned in the syllabus,not restricted to the specialization.
- Internshipcanbedone,inoneofthefollowing,butnotrestrictedto,types of organizations:
    - Softwaredevelopmentfirms
    - Hardware/manufacturingfirms
    - Anysmallscaleindustries,serviceproviderslikebanks
    - Clinics/NGOs/professionalinstitutionslikethatofCA,Advocateetc
    - CivicDeptslikeWardoffice/postoffice/policestation/punchayat.

GuidelinesformakingInternshipReport

AstudentisexpectedtomakeareportbasedontheinternshipheorshehasdoneinAn organization. It should contain the following:

- **Certificate:**AcertificateintheprescribedPerforma(giveninappendix1)from the organizationwheretheinternshipdone.
- **Evaluationform:**Theformfilledbythesupervisorortowhomtheinternwas reporting, in the prescribed Performa (given in appendix 2).
- **Title:** A suitable title giving the idea about what work the student has performed during the internship.
- **Description of the organization:** A small description of 1 to 2 pages on the organizationwhere the student has interned
- **Description about the activities done by the section where the intern has worked**: A description of 2 to 4 pages about the section or cell ofthe organization where the intern actually worked. This should give an idea about thetype of activity a new employee is expected to do in that section of the organization.
- **Description of work allotted and actually done by the intern:** A detailed descriptionof the work allotted and actual work performed by the intern duringthe internship period.Intern may give a weekly report of the work by him or her ifneeded. It shall be of around 7 to 10 pages.
- **Self assessment:** A self assessment by the intern on what he or she has learnt during the internship period. It shall contain both technical as well as interpersonalskills learned inthe process. It shall be of around 2 to 3 pages.

The internship report may be around 20 to 30 pages and this needs to be submitted to theexternal examiner at the time of University examination.

Appendix1

(Proformaforthecertificateforinternshipinofficialletterhead)

This is to certify thatMr/Ms _____of _____College/Institution worked as an intern as part of her B.Sc. course in Computer Science of Thiruvalluvar University. The particulars of internship are given below: Internship starting date: _____

Internship ending date:_____

Actual number of days worked:_____

Tentativenumberofhoursworked:_____Hours

Broadareaofwork:_____

Asmalldescriptionofworkdonebytheinternduringtheperiod:

_____

_____

_____

_____

_____

Signature:

Name:

Designation:

Contactnumber:

Email:

(Sealoftheorganization)

Appendix2

(ProformafortheEvaluationoftheinternbythesupervisor/towhomtheinternwas reporting in the organization)
ProfessionalEvaluationofintern

Name of intern:_____College/institution:____

[Note:Giveascoreinthe1-5scalebyputting√intherespectivecells]

S.No.	Particular	Excellent	Very Good	Good	Moderate	Satisfactory
1	Attendance					
2	Punctuality					
3	Adaptability					
4	Abilityto shoulder responsibility					
5	Abilitytoworkinateam					
6	Writtenandoral communicationskills					
7	Problemsolvingskills					
8	Abilityto graspnewconcepts					
9	Abilitytocompletetask					
10	Qualityofworkdone					

Comments:

_____

_____

_____

Signature:

Name:

Designation:

Contactnumber:

Email:

(Sealoftheorganization)

SEMESTER VI

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA13	**DATA MINING**	**Core**	Y	-	-	-	4	6	25	75	100

Course Objective	
LO1	To understand the basic concept of data mining process
LO2	To understand the association rule mining,
LO3	To understand classification.
LO4	To understand cluster analysis.
LO5	To understand web data mining.

UNIT	**Details**	**No. of Hours**
I	**Introduction:** Data mining applications – Data mining techniques – Data mining case studies – The future of data mining – Data mining software	15
II	**Classification:** Introduction – Decision tree – Over fitting and pruning – Decision Tree rules – Naïve bayes method – Estimation predictive accuracy of classification methods	15
III	**Cluster analysis**: Cluster analysis – Types of data – Computing distances–Types of cluster analysis methods – Partitioned methods–Dealing with large databases – Quality and Validity of cluster analysis methods – Cluster analysis software.	15
IV	**Association rules mining:** Introduction– Basics– Task and a naïve algorithm– Apriori algorithm – Mining frequent pattern without candidate generation (FP–growth) – Performance evaluation of algorithms.	15
V	**Online Analytical Processing(OLAP):** Introduction – OLAP – Characteristics of OLAP Systems –Motivations for Using OLAP – Multidimensional View and Data Cube – Data Cube Implementations – Data Cube Operations– Guidelines for OLAP Implementation – OLAP Software.	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Acquire the knowledge of Data mining concepts and Techniques	PO1
CO2	Recall the concepts of Online Analytical Processing	PO1, PO2
CO3	Recall the concepts involved in data and database Systems	PO4, PO6
CO4	Understand various tools of Data Mining to solve the real time problems.	PO4, PO5, PO6
CO5	Summarize the applications of Data Mining.	PO3, PO8
Textbooks		
1	"**Introduction to Data mining with case studies**", G.K. Gupta, PHI Private limited, New Delhi, 2008. UNIT I: Chapter 1 UNIT II: Chapter 3 UNIT III: Chapter 4 UNIT IV: Chapter 2 UNIT V: Chapter 8	
Reference Books		
1.	**"Data warehousing and Data Mining**" - B.S. Charulatha, S. Poonkuzhali, C.Saravanakumar, Charulatha Publications.	
Web Resources		
1.	https://www.tutorialspoint.com	
2.	https://www.javatpoint.com	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	2	1	3	1	2
CO 2	3	3	1	1	3	3
CO 3	3	2	2	2	2	3
CO 4	1	2	3	2	2	1
CO 5	1	1	2	1	1	1
Weightage of course contributed to each PSO	10	12	9	9	9	10

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

Title of the Course/ Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UCA14	VB.NET PROGRAMMING	Core	Y	-	-	-	4	6	25	75	100

Course Objective		
LO1	To Understand Basics of DotNet Framework.	
LO2	To Understand the various Programming Concepts of VB.Net	
LO3	To Understand Methods and Arrays in VB.Net	
LO4	To Understand Interfaces	
LO5	To Understand Database Connectivity	
UNIT	**Details**	**No. of Hours**
I	**NET Framework and VB.NET:** Introduction to Microsoft.Net Framework: Component of VB.Net Framework – VB.Net Language. Features in VB.NET: – Start Page – IDE Main Window – Class View Window – Object Browser – Code Window – Compiling the Code – Code Debugging - Developing a Simple VB.NET Console Application – Developing Simple VB.NET Project through Visual Studio IDE.	15
II	**Variables Constants and Expressions:** Value Types and Reference Types – variable Declaration and Initialization – Value Data Types – Reference Data Types - Boxing and Unboxing – Arithmetic Operators and expressions - Text Box Control - Label Control - Button Control – Control Statements – IF Statement - Radio Buttons - Check Box – Group Box - List Box – Checked Listbox - Combo Box Control – InputBox – MsgBox . Control Statements: Decision making: IF Statement – IF-Else Statement – Select – Case. Looping Statement: – While – Do – For Statements.	15
III	**Methods and Arrays** - Types of Methods - Arrays – One Dimensional – Multidimensional Arrays – Jagged Arrays - Classes Properties and Indexes: Definition and Usage of Class - Constructor Overloading - Copy Constructor – Instance and Shared Class Members – Shared Constructor - Properties - Indexes Inheritance and Polymorphism	15
IV	**Definition and Usage of Interfaces** – Namespaces - Delegates – Events – Default Exception Handling Mechanism – User Defined Exception Handling Mechanism – Back Tracking – Throw Statement - Custom Exception – Usage of Thread – Thread Class – Start() , Abort(), Join(), Sleep(), Suspend() and Resume Methods	15
V	**Database Connectivity:**ADO.NET Object Model - Advantages of ADO.NET – Managed Data Providers – Developing Simple Application – Creation of a Data Table – Retrieving Data from Tables – Table Updating	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Would have learnt the fundamentals of VB.Net	PO1
CO2	Would have learnt the Various Techniques of Data Communication Networks.	PO1, PO2
CO3	Define the structure and fundamental concept of windows programming	PO4, PO6
CO4	Demonstrate various control statements ,arrays, menus and tool bars	PO5
CO5	Construct program using windows and web form controls.	PO3, PO6
Textbooks		
1	Visual Basic. Net, C. Muthu, Vijay Nicole Imprints Private Limited UNIT I: Chapter 2 UNIT II: Chapter 3, 4 UNIT III: Chapter 5, 6, 7 UNIT IV: Chapter 8, 9, 10, 11 UNIT V: Chapter 12, 15	
Reference Books		
1.	The Complete Reference – Visual Basic . NET – Jefrey R. Shapiro , Tata McGraw Hill, 2002.	
Web Resources		
1.	https://www.tutorialspoint.com	
2.	https://www.javatpoint.com	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	2	3	1	1	2
CO 2	3	2	2	1	3	3
CO 3	2	3	2	3	2	2
CO 4	2	3	1	1	2	2
CO 5	3	2	1	3	2	3
Weightage of course contributed to each PSO	12	12	9	9	10	12

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCA15P	VB.NET PROGRAMMING – PRACTICAL	Core		-	Y	-	4	5	40	60	100

Course Objective	
LO1	Be able to design and program VB.Net applications.
LO2	Be able to create loops and decision statements in VB.Net.
LO3	Be able to work with functions and pass arguments in VB.Net.
LO4	Be able to build and package VB.Netmodules for reusability.
LO5	Be able to read and write files in VB.Net.
Sl.No	**Details**
1.	Develop a simple VB.NET application using controls. a. Finding factorial Value, b. Money Conversion
2.	Write a VB.NET Program to perform the case conversion
3.	Write a VB.NET Program to create and validate login form using select case
4.	Write a VB.NET Program that makes use of InputBox, MsgBox and ListBox.
5.	Write a VB.NET Program that makes use of Picture Box control.
6.	Develop a menu based VB.NET application to implement a text editor with cut, copy, paste,save and close operations.
7.	Design a form to create calculator application
8.	Write a VB.NET Program that makes use of check box, radio button and list boxes.
	Console Applications.
9.	Boxing and Unboxing
10.	Constructor
11.	Inheritance
12.	Polymorphism.
13.	Exception Handling
14.	Thread
15.	Database Connectivity

Course Outcomes	
On completion of this course, students will	
CO1	Would have learnt the fundamentals of VB.Net
CO2	Outline the sequence control and data control.
CO3	Understand .NET Framework architecture, its components and basics of Visual Studio.
CO4	Analyze the problem and create window based program with Visual Basic.
CO5	Develop and implement window based application using Visual Basic.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**1**	**2**	**2**	**2**	**3**	**2**
CO 2	**1**	**1**	**3**	**2**	**2**	**2**
CO 3	**3**	**3**	**1**	**1**	**1**	**2**
CO 4	**2**	**3**	**3**	**1**	**2**	**1**
CO 5	**3**	**2**	**3**	**1**	**1**	**1**
Weightage of course contributed to each PSO	10	11	12	7	9	8

S-Strong-3

M-Medium-2 L-Low-1

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE3A	DATA COMMUNICATION AND NETWORKS	Core	-	-	Y	-	4	4	25	75	100

Course Objective		
LO1	To understand the basic concept of Data Communication process	
LO2	To understand the OSI model	
LO3	To understand Transmission Of Media.	
LO4	To understand Switching.	
LO5	To understand Internet working.	
UNIT	**Details**	**No. of Hours**
I	**Data Communication** – Networks – Protocols And Standard – Line Configuration – Topology – Transmission Mode – Categories Of Networks – Internet Works	15
II	**The OSI Model** – Functions Of The Layers – TCP/IP Protocols Suite – Signals – Analog And Digital Signal – Data Transmission – Data Terminal Equipment – Data Circuit Terminals Equipment – Modems	15
III	**Transmission Of Media** – Guided Media – Unguided Media – Transmission Impairments – Media Comparison - Error Detection – Types of Errors Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) - Check Sum	15
IV	**Switching** – Circuit Switching – Packet Switching – Message Switching - Networking And Internet-working Devices: Repeaters – Bridges – Routers – Gateways - Routing Algorithm: Distance Vector Routing – Link State Routing	15
V	**Internet Working:** TCP/IP Protocol Suite – Client Server Model – Domain Name System – File Transfer Protocol (FTP) – Simple Mail Transfer Protocol (SMTP) – World Wide Web (WWW) – Hyper Text Transfer Protocol (HTTP)	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Would have learnt the fundamentals of Communication Networks	PO1
CO2	Would have learnt the Various Techniques of Data Communication Networks.	PO1, PO2
CO3	Have a good understanding of the OSI Reference Model& Information security.	PO4, PO6
CO4	Ability to analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.	PO4, PO5, PO6
CO5	Students understands the concepts in the areas of Information Security	PO3, PO8
Textbooks		
1	"Data Communications and Networking" –2nd Edition- Behrouz A Forouzan UNIT I: Chapter 1 UNIT I: Chapter 1, 2(2.1 To 2.4) UNIT I: Chapter 3(3.1to3.3), 4(4.1 To 4.6) UNIT III: Chapter 7(7.1 To 7.3), 9(9.1 To 9.6) UNIT IV: Chapter 14(14.1 To 14.3), 21(21.1 To 21.8) UNIT V: Chapter 25(25.1, 25.3, 25.5, 25.7, 25.9, 25.10)	
Reference Books		
1.	Computer Networks –William Stallings	
2.	Computer Networks- Tanenbaum	
Web Resources		
1.	https://www.tutorialspoint.com/	
2.	https://www.javatpoint.com	

Mapping Course Outcomes with Programme Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	9	1
CO2	3	9	9	3	1
CO3	3	9	1	3	3
CO4	1	3	3	1	3
CO5	3	9	9	1	3
Weightage Percentage of Course Contribution of PO's	11	33	25	17	11

1 – Low; 3 - Medium; 9 – Strong

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE3B	SOFTWARE PROJECT MANAGEMENT	Elective	Y	-	-	-	3	5	25	75	100

Course Objective		
LO1	To Understand the Concepts of Project Management	
LO2	To Understand the Planning aspects of a Software Project	
LO3	To Understand Software Cost Estimation	
LO4	To understand Project Planning.	
LO5	To understand Activity Planning.	
UNIT	**Details**	**No. of Hours**
I	Introduction to software management: Introduction-Importance of SPM –Project- Software project Vs other type of project – Contract and technical project management – Activities- plan, methods And methodologies – categorizing software projects – stakeholders – Setting objectives – Business case – project success and failures –Managements.	13
II	**EVALUATION & MANAGEMENT**: Project Evaluation and Programme Management: Introduction-Business case-Project portfolio management- Evaluation of individual Projects-Cost benefit Evaluation Techniques - Risk Evaluation - Programme Management – managing the allocation of resources – Strategic programme management – Creating a programme and aids –Benefits management.	15
III	**PROJECT PLANNING**: Overview of Project Planning: Introduction- Stepwise Project Planning- steps. Selection of An Appropriate Project Approach: Introduction-Build or buy- Choosing methodologies and technologies-- software Processes and models-choice of Process models- Structure Vs speed of delivery – Waterfall model - spiral model – software prototyping - Rapid application development – Agile methods- Extreme programming.	15
IV	**PROCESS MODELS - REVISIT**:Software Effort Estimation: Introduction-Where are estimates done? – Problems with over and under estimates – Basis for estimating and its Techniques – Bottom up estimating-Top down approach and parametric models- Expert judgment-Estimating by analogy Function point analysis-FP mark-II - COSMIC full FP-COCOMO II-cost estimation and staffing patterns.	15

V	**EFFORT ESTIMATION**:Activity Planning: Introduction-objectives-when to plan?-project schedules-Projects activities-network Planning models-sequencing and scheduling activities-Formulating a network model-Adding the time dimension-Forward and backward Pass- critical Path-activity Float- Shortening the project duration-critical activities- Activity on arrow network.	15
VI	**Contemporary Issues:** Expert lectures, online seminars – webinars	2
	Total	**75**

Course Outcomes		**Programme Outcomes**
CO	On completion of this course, students will	
CO1	Understand and apply the cryptographic algorithms to safeguard from intruders	PO1, PO2
CO2	Learnt about Software Cost Estimation	PO2, PO3
CO3	Implement the various aspect of Software Activity Planning.	PO3
CO4	Identify the framework of project management	PO4, PO5
CO5	Design and implement software configuration management	PO5, PO6

Textbooks	
1	"Software Project Management" – Bob Hughes, Mike Cotterell and Rajib Mall, 5th Ed.

Reference Books	
1.	"Software Project Management", Walker Royce, Pearson Education.

Web Resources	
1.	http://brodzinski.com/2010/06/learning-project-management-basics.html

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	1	1	1	3	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	1
CO5	1	1	1	3	1
Weightage Percentage of Course Contribution of PO's	5	5	5	15	5

1 – Low; 3 - Medium; 9 – Strong

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE4A	E - COMMERCE AND ITS APPLICATIONS	Elective	Y	-	-	-	3	5	25	75	100

Course Objective		
LO1	To know the concepts of internet	
LO2	To know the concepts e-commerce and their applications	
LO3	To learn the internet as network infrastructure	
LO4	To learn the advertising and marketing techniques on the internet.	
LO5	To know the concepts network security and firewalls	
UNIT	**Details**	**No. of Hours**
I	**INTRODUCTION:** Electronic Commerce Frame Work: The Anatomy of E-Commerce Applications- Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications – The Network Infrastructure for E-Commerce: Components of Highway – Network Access Equipment – Global Information Distribution Networks -	15
II	**The Internet as Network Infrastructure:** The Internet Terminology/Chronological History Of The Internet- The Business Of Internet Commercialization: Telco/Cable/Online Companies – National Independents ISPs – Regional Level ISPs – Local Level ISPs	15
III	**Network Security And Firewalls:** Client Server Network Security – Firewalls And Network Security – Data And Message Security – Challenge Response System – Encrypted Documents And Electronic Mail – Architectural Framework For E-Commerce- Technology Behind The Web – Security And The Web	15
IV	**Inter Organizational Commerce and EDI:** Electronic Data Interchange – EDI Application in Business – EDI Implementation, MIME and Value Added Networks: EDI Software Implementation – EDI Envelope for Message Transport- Value-Added Networks (VANs) – Electronic Payment System	15
V	**Advertising And Marketing On The Internet:** The New Age Of Information Based Marketing – Advertising On The Internet – Charting The Online Marketing Process – Software Agents – Characteristics And Properties Of Agents – The Technology Behind Software Agents – Applets, Browsers And Software Agents	15
	Total	**75**

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Would have learnt the Concepts of E-Commerce.	PO1, PO2
CO2	Understand the concept of internet and e-commerce applications.	PO2, PO3
CO3	Learn about history of internet and internet providers.	PO3
CO4	Understand and apply the security systems on e-commerce.	PO4, PO5
CO5	Know about EDI concept.	PO5, PO6
Textbooks		
1	Ravikalakota& Andrew Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 2000. UNIT I: Chapter 1, 2; UNIT II: Chapter 3, 4; UNIT III: Chapter 5, 6 UNIT IV: Chapter 9, 10; UNIT V: Chapter 13, 16	
Reference Books		
1.	Electronic Commerce – Rary P. Schneider and James T. Parry.	
Web Resources		
1.	http://brodzinski.com/2010/06/learning-project-management-basics.html	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	1	3	9
CO2	3	1	3	9	1
CO3	9	3	9	3	1
CO4	9	3	1	9	3
CO5	9	3	9	3	1
Weightage Percentage of Course Contribution of PO's	33	13	23	25	15

1 – Low; 3 - Medium; 9 – Strong

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	Inst. Hrs.	CIA	Ext.	Total
23UCAE4B	HUMAN COMPUTER INTERACTION	Elective	Y	-	-	-	3	5	25	75	100

CourseObjective		
LO1	To learn about the foundations of Human Computer Interaction.	
LO2	To learn the design and software process technologies.	
LO3	To learn HCI models and theories.	
LO4	To learn Mobile Ecosystem.	
LO5	To learn the various types of Web Interface Design.	
UNIT	**Details**	**No.of Hours**
I	**FOUNDATIONS OF HCI :** The Human: I/O channels – Memory - Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies	5
II	**DESIGN & SOFTWARE PROCESS:** Interactive Design: Basics – process – scenarios Navigation: screen design Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design	5
III	**MODELS AND THEORIES:** HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.	5
IV	**Mobile HCI:** Mobile Ecosystem: Platforms, Application frameworks Types of Mobile Applications: Widgets, Applications, Games Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies	5
V	**WEB INTERFACE DESIGN:** Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies	5
	Total	**25**

Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand thefundementals of HCI.	PO1
2	Understand the design and software process technologies.	PO1, PO2
3	Understand HCI models and theories.	PO4, PO6
4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	PO4, PO5, PO6
5	Understand the various types of Web Interface Design.	PO3, PO8
Text Book		
1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human -Computer Interaction‖", III Edition, Pearson Education, 2004 (UNIT I, II & III)	
2	Brian Fling, —"Mobile Design and Development", I Edition, O'Reilly Media Inc., 2009(UNIT–IV)	
3	Bill Scott and Theresa Neil, —Designing Web Interfaces‖, First Edition, O'Reilly, 2009. (UNIT-V)	
Reference Books		
1.	Shneiderman, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", V Edition, Pearson Education. The Human-Computer Interaction Handbook Fundamentals, Evolving Technologies and Emerging Applications, Second Edition, Andrew Sears, Julie A. Jacko, Julie A. Jacko, by Andrew Sears , Julie A. Jacko	
Web Resources		
1.	https://www.interaction-design.org/literature/topics/human-computer-interaction	
2.	https://link.springer.com/10.1007/978-0-387-39940-9_192	
3.	https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction	
4.	https://www.tutorialspoint.com/human_computer_interface/index.htm	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	**3**	**2**	**2**	**2**	**2**	**-**
CO 2	**3**	**3**	**2**	**2**	**-**	**2**
CO 3	**1**	**2**	**2**	**3**	**2**	**3**
CO 4	**1**	**2**	**2**	**3**	**3**	**3**
CO 5	**1**	**2**	**3**	**2**	**2**	**-**
Weightage of course contributed to each PSO	9	11	13	12	9	8

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

Title of the Course / Paper	Subject Name	Category	L	T	P	S	Credits	CIA	Ext.	Total
23UCA12PW	Project with Viva voce		4	-	-	-	4	25	75	100

Learning Objectives	
LO1	Advancefromanintellectuallycuriousstudenttoacreator/makerandanindustryprofessional
LO2	Applyverbalandwrittencommunicationskillstoexplaintechnicalproblem-solvingtechniques andsolutionstoanincreasinglydiverseandglobalaudience
LO3	Collaboratewithinandacrossdisciplinaryboundariestosolveproblems
LO4	Applymathematicaland/orstatisticalmethodstofacilitateproblemsolving.
LO5	Exercisecomputationalthinkingovertheentiresoftwarelifecycle.

Project Work

SL	Area of Work	Maximum marks
1.	**PROJECTWORK:** (i)Project Proposal and Plan	10
	(ii)ExecutionoftheProjectProposalandPlan/Collectionof data, Documentation and Presentation of the report.	40
2.	VivaVoceExamination	25
	TOTAL	**75**

*CIAMarks=25marks(ProjectReview1,ProjectReview2andProjectReview3)

CourseOutcomes		Programme Outcomes
CO	Onsuccessfulcompletion ofthiscourse,studentswillbeable to	
1	Showleadershipskillsandlearntimemanagement	PO1,PO2,PO3, PO4,PO5,PO6
2	Identifyvarioustoolstobeappliedtoaspecificproblem	PO1,PO2,PO3, PO4,PO5,PO6
3	Evaluatethereports	PO1,PO2,PO3, PO4,PO5, PO6
4	Takepartinateamaswellasmanageittodeliver stunning Outcomes	PO1,PO2,PO3, PO4,PO5, PO6
5	Assessanddeveloptheindividualskillstopresent and Organizeprojects	PO1,PO2,PO3, PO4,PO5, PO6

MappingwithProgrammeOutcomes:

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2
CO2	3	3	3	2	2	3
CO3	2	2	1	3	3	3
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	1
Weightageofcourse contributed to each PSO	14	14	13	14	14	11

Strong-3M-Medium-2 L-Low-1